REPORT RESUMES

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FEASIBILITY OF ESTABLISHMENT OF ASSOCIATE DEGREE PROGRAM IN MARINE TECHNOLOGY AT CLATSOP COMMUNITY COLLEGE.

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DESCRIPTORS- EMPLOYMENT OPPORTUNITIES, EDUCATIONAL NEEDS, EMPLOYMENT TRENDS, COMMUNITY COLLEGES, *MARINE TECHNICIANS, *CURRICULUM, OCCUPATIONAL SURVEYS, *CURRICULUM DEVELOPMENT, ASSOCIATE DEGREES, *TECHNICAL EDUCATION, QUESTIONNAIRES, HIGH SCHOOL STUDENTS, VOCATIONAL INTERESTS, FEASIBILITY STUDIES, CAPE FEAR TECHNICAL INSTITUTE, NORTH CAROLINA, CLATSOP COMMUNITY COLLEGE, OREGON, PENINSULA COLLEGE, WASHINGTON, MARINE TECHNOLOGY, MARINE VOCATIONAL TECHNICAL INSTITUTE,

THIS STUDY ATTEMPTS TO DETERMINE WHAT BASES EXIST FOR ESTABLISHING THE FIRST CURRICULUM OF THIS NATURE ON THE WEST COAST. DISCUSSIONS WERE HELD BETWEEN LOCAL MARITIME PEOPLE AND THE COLLEGE STAFF. RESULTS OF A SURVEY OF 51 HIGH SCHOOLS SHOWED 264 STUDENTS INTERESTED IN ENROLLING. A SURVEY OF 79 GOVERNMENT AND INDUSTRY EMPLOYERS INDICATED THAT 142 EMPLOYEES WOULD BE EMPLOYABLE FOR LONGER TERMS IF THEY HAD THIS TRAINING, 75 OTHER PERSONS WERE INTERESTED IN THE TRAINING, AND APPROXIMATELY 2,588 PERSONS PER YEAR HAD BEEN REFUSED EMPLOYMENT BECAUSE THEY LACKED THIS TRAINING. AN EMPLOYMENT SURVEY OF 46 MARITIME INDUSTRIES IN OREGON INDICATED THAT 414 ADDITIONAL EMPLOYEES WOULD BE NEEDED IN 2 YEARS AND 559 WOULD BE NEEDED IN 5 YEARS. ANOTHER PORTION OF THE SURVEY WAS BASED ON A TENTATIVE CURRICULUM WHICH WAS DERIVED FROM JOB ANALYSIS, AND FROM TWO EXISTING CURRICULA FROM THE EAST COAST. EMPLOYERS WERE ASKED TO RATE THE CURRICULUM ELEMENTS AS TO THEIR IMPORTANCE IN LIGHT OF TRAINING NEEDS. IT WAS RECOMMENDED THAT (1) THE SECOND-YEAR CURRICULUM BE REFINED IN LIGHT OF NEW INFORMATION, (2) VOCATIONAL AND TECHNICIAN OPTIONS BE OFFERED, (3) SHIPBOARD INSTRUCTION BE INCLUDED, (4) EXISTING COURSES BE USED WHEN POSSIBLE, (5) CONTACT BE MAINTAINED WITH INDUSTRY AND GOVERNMENT, AND (6) MERCHANT MARINE TRAINING BE EXPLORED. SURVEY FORMS, SURVEY DATA, AND CURRICULUM INFORMATION ARE INCLUDED IN THE APPENDIX. (EM)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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Feasibility of
Establishment of Associate Degree Program
in
Marine Technology
at
Clatsop Community College

Prepared by
Paul Tolonen, Project Director

The Research Reported Herein
was Supported by the
State Department of Education
Division of Community Colleges
and Vocational Education

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1965

June 30, 1965

Dr. William G. Loomis, Director
Vocational Education
State Department of Education
Salem, Oregon

Dear Doctor Loomis:

In accordance with our agreement dated March, 1965 we are submitting a report on a joint study entitled "Feasibility of Establishment of Associate Degree Program in Marine Technology at Clatsop Community College."

In the process of making this survey it was heartwarming to see, first-hand, the enthusiastic support of the Advisory Committee members and Consultants toward this educational program.

It is our conclusion that such a program, when in operation, will provide vocational training for many individuals who seldom think of the multiplicity of job opportunities available to them in this far-reaching industry.

We believe that Mr. Paul Tolonen, our Director of the project, has completed an important piece of work in the content of this study and in the preparation of this report.

Sincerely,

Richard D. Boss

Richard D. Boss, President
Clatsop Community College

RDB:vmb

APPROVALS

The essence of this report has been approved by the members of the local Advisory Committee on Marine Technology, the Marine Technology Consultants, and by Richard D. Boss, President of Clatsop Community College.

COPY

Mr. Richard D. Boss
President
Clatsop Community College
Astoria, Oregon

Dear Mr. Boss:

We have reviewed in detail the information received from Clatsop College concerning the Feasibility Survey for Presentation of a Curriculum in Marine Technology at your college.

Although the Feasibility Survey and analysis of data received are still in progress, we are in accord in endorsing a marine technology program of the type that is proposed. Obviously, we cannot speak for the entire spectrum of work areas involved in training of the type envisaged; however, we can state that in the fishing industries, the field of fisheries oceanography, and the maritime industries in general, there is a need for well-trained technicians; that is, scientists have many times ended up spending their efforts doing jobs that could be handled by technicians.

It is difficult at this point to interpret the curriculum presented in terms of options; that is, whether or not the candidates or students will be in position to emphasize certain training areas. It would be our hope that the training program would call for a rather general curriculum during the first year, but would allow specialization during the second calendar year. It would seem that this approach would allow students to achieve skills required to follow their special interest, and certainly it would provide the type of training more suitable for students who would be interested in obtaining employment in the field of marine sciences. Undoubtedly, in your final analysis of courses to be provided, the college will be required to make some selection of courses offered and areas of specialization.

We are looking forward and hoping that your college might make a contribution to the maritime industries and allied pursuits through the training of marine technicians. If we may be of further help in counseling along these lines, do not hesitate to call on us as a group, or individually.

Sincerely yours,

/S/ Lawrence Barber, Consultant
Marine Editor, The Oregonian

/S/ Bruce Wyatt, Consultant
Oregon State University

/S/ Lee Alverson, Consultant
Seattle Bureau of Commercial
Fisheries

OFFICIAL DISTRIBUTION LIST

Dr. William G. Loomis and State Department of Education

President Richard D. Boss, Clatsop Community College

Marine Technology Survey Consultants, Lee Alverson, Bruce Wyatt and Lawrence Barber

Marine Technology Local Advisory Committee

Clatsop Community College Board of Directors

ACKNOWLEDGMENTS

The research reported herein was supported by a grant from the U. S. Department of Health, Education, and Welfare, U. S. Office of Education.

This survey could not have met the established objectives without the assistance of a number of people:

Dr. William G. Loomis, State Director of Vocational Education, Oregon State Department of Education, assisted by Mr. Ronald E. Kaiser and Mr. Donald M. Gilles, Oregon State Department of Education

Mr. Richard D. Boss, President, Clatsop Community College

Mr. Lee Alverson, Mr. Bruce Wyatt and Mr. Lawrence Barber, Consultants

Mr. Harold Doan, Mr. Richard Carruthers Jr., Mr. Robert Loeffel, Capt. Edgar Quinn, Mr. Donald Edy, Mr. Arthur Anderson and Mr. Elmer Copstead, comprising the local Advisory Committee

Mr. Gary Milburn, Fisheries Biology graduate student, a tabulation volunteer

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SECTION ONE

ABSTRACT AND SUMMARY

ABSTRACT AND SUMMARY

Purpose

This research survey was performed for the purpose of determining to what extent logical bases exist indicating the advisability of presenting a curriculum in Marine Technology at Clatsop Community College as defined by the tentative curriculum incorporated in a survey questionnaire. Specifically, this effort was translated into an appraisal of job opportunities, numbers of potential students and curricular considerations. Continuing above this plateau of information, and contingent upon advance questionnaire results being positive, were refinement of the curriculum and the gathering of cost data.

An institutional purpose at Clatsop Community College is the dedicated intent to participate in the national effort to pursue assiduously a continuing program of correlating the academic and vocational offering to manpower training needs as they exist today.

Procedure

Preceding acceptance of the proposal as a formal research project yet significantly part of the procedures are the following:

1. Informal discussion of this curricular concept and testing of reaction in local maritime circles by interested members of the Clatsop Community College staff.
2. Meeting called by Richard D. Boss, Clatsop Community College President, of persons from education, government and industry who might logically be interested. Attendance was not limited to individuals from the local commuting area.

3. Submitting of formal research proposal according to procedures recommended by Dr. William G. Loomis, Director of Vocational Education, Oregon State Department of Education.

Procedures relevant to execution of the formal survey were outlined in the research proposal. Appropriate minor modifications were made to expedite completion of the survey in the allotted time. Responsibility for pursuing the study was vested in the Project Director, who in turn was assisted by a local Advisory Committee, a panel of three Consultants and members of the staff at Clatsop Community College. Following is the general order of events:

1. Selection of the local Advisory Committee.
2. Initial meeting of Advisory Committee. Suggestions solicited on tentative curriculum and questionnaire.
3. Questionnaire prepared with tentative curriculum.
4. Consultants selected.
5. Initial meeting held, of Consultants. Objectives explained and rough draft of questionnaire discussed.
6. Second meeting of local Advisory Committee (attended by Consultants). Rough draft of questionnaire examined for comment, addition and refinement.
7. Questionnaire refined.
8. Mailing list prepared.
9. Questionnaires on curriculum, recruitment and employment potential mailed to government and industry.
10. Separate questionnaire mailed to high schools in Oregon on student recruitment potential.

11. Returns tabulated and evaluated.
12. Conferences with Consultants and Advisory Committee.
13. Related information compiled (cost, facilities available, etc.).
14. Preparation of final report.

Results and Conclusions

Conducting the survey resulted in the acquiring of data in sufficient volume and of appropriate sampling such that objectives as expressed in the research proposal were attained. It became apparent from the job positions listed as anticipated needs by potential employers that training should include elements of several identifiable shoreside classifications; and that serious consideration should be given to the presenting of two types of training, through optional electives or through selection of second-year curriculum to include: training adaptable to any of several maritime options where operation and/or production are paramount; and training leading to positions as marine laboratory technicians, biological technicians, scientific aides and other work situations which would require more study in the natural and physical sciences. These positions would occupy a supporting role to scientific personnel.

The likihood of job openings being available to graduates of a two-year program in Marine Technology is expressed by the following survey data:

ABSTRACT AND SUMMARY
-Results and Conclusions-

1. Anticipated needs in two years by all agencies approached is 414.
2. Anticipated needs in five years by all agencies approached is 559.

A pioneer institution in Marine Technology is the Maine Technical-Vocational School, which experiences no difficulty in placing graduates.

Availability of students for entry into the training program is expressed by the following survey data:

1. Number of persons who might leave work to take training is 142.
2. Number of high school students in Oregon who "indicate a likilhood of enrolling if a program is available" is 264. (Based on 51 returns.)

The survey was confined to the State of Oregon except for some returns solicited from governmental agencies with regional activities. The apparent conclusion obtained was that insofar as student recruitment and job opportunity are concerned a program offered at the College should be successful. Cost data prepared is for use of the administration to use in appraisal of other factors.

SECTION TWO

DISCUSSION

INTRODUCTION

The School

Clatsop Community College at Astoria, Oregon is the focal point from which this survey was conducted. The institution is presently budgeting for the equivalent of 400 full-time students. Approximately twice this number will be actually participating in classes. Clatsop is one of the several new community colleges in Oregon which are spearheading the movement for this kind of education in this state. The school operates as a day school with courses also offered at night. The full-time staff numbers approximately thirty. A number of part-time instructors and non-teaching full-time personnel also assist in carrying out the objectives of the institution. Both Liberal Arts and Sciences transfer courses and Vocational-Technical courses are offered. All two-year programs in the latter division can lead to the Associate Degree.

Facilities at Clatsop consist of a new Industrial Mechanical Laboratory building and two older school buildings, one of which has been extensively remodeled for classrooms, laboratories, offices, library and student activities. Architectural plans are completed for additional remodeling, for an Engineering Technology building and a library. Student funds are being accumulated for a student center. The entire installation is situated overlooking the Columbia River estuary and its confluence with the sea on a site approximately 40 acres in extent.

The local Community College District is coincident with the boundaries of Clatsop County although some students come from far beyond the

District boundaries. The local commuting area contains from 25,000 to 30,000 people.

The Community

Referring to the Community College District as the community, little can be said to set it apart economically from other Oregon coastal communities. Basic industries of fishing and lumbering have long been prime sources of support. Agriculture, although not absent, is less in evidence. Dairying and livestock production manifestly occupy the largest agricultural role. By far the largest part of the terrain and soil characteristics of the area make it ideally suited for gorowing successive crops of timber. Crown Zellerbach Corporation has the largest timber land ownership in Clatsop County. The company management is disposed to support activities of the College by providing scholarships, tours and demonstrations. The manufacture of pulp and paper is the largest new emerging local industry with a multi-million dollar complex being installed at Wauna in the east end of the county.

Principal industries are fishing, seafood processing, lumbering, shipping, dairying and the production of livestock, including fur-bearing animals. The last named are usually fed the offal of the sea. Mink ranches in Clatsop County produce 100,000 pelts yearly, worth two million dollars gross. Required for mink feed annually is ten million pounds of fish and 400,000 pounds of whale meat. The mink ranchers find themselves close to the food supply, an important part of which comes from the sea.

The fishing industry has been beset by threats from many quarters, such as the construction of dams, river pollution, an expanded and sometimes hostile sports fishery, foreign competition and rising costs. Very recently there have been evidences of a resurgence in the local fishery. More important, the state electorate has chosen in favor of commercial fishing vs a group of sports fishermen in defeating Initiative No. 4 in the November, 1964 election. This measure would have closed the Columbia River to commercial fishing. Largest of the fish packing concerns is Bumble Bee Seafoods, canning the local products as well as thousands of tons of Japanese tuna at Astoria annually. This firm has shown more than a passing interest in development of the College, awarding scholarships, providing advice and hiring graduates.

The local fishermen, as individuals, are skilled in their calling and have provided an ordinary degree of community support. They have not always responded in appreciable numbers, however, to avail themselves of additional schooling, many, in the past, feeling that theirs is a calling requiring little that schools have to offer. Most fishermen learned their calling by acceptance to trainee status by some experienced fisherman willing to "show them the ropes". With modern electronics, hydraulic, pneumatic and mechanical equipment in use, the value of training in a school situation becomes increasingly obvious.

Tourism is presently Oregon's third largest industry. The coast draws heavily in summer from this source of economic gain. Large numbers of individuals annually seek to join charter-boat fishing expeditions as a source of recreation. Clatsop County draws more than a fair share of economic benefit from tourism.

The State

The State of Oregon has the following characteristics which are pertinent to this study in Marine Technology. The first item is an excerpt from State of Oregon Department of Employment publication "Oregon Covered Employment and Payrolls..." Third Quarter 1964:

			Covered Employment			Payrolls
Ind. Code	Industry Description	Rpt. Units	July	Aug.	Sept.	3rd Qtr. 1964
44	Water Transportation	118	3574	3866	3625	$6,694,536
441	Deep Sea Foreign Transportation	9	91	84	85	168,528
442	Deep Sea Domestic Transportation	6	88	84	87	223,140
444	Transportation on Rivers and Canals	19	465	462	468	913,947
445	Local Water Transportation	29	446	470	455	896,416
446	Services Incidental to Water Transportation (Including Longshoring)	55	2484	2766	2530	4,492,505

The following excerpt is from "A Study to Determine Vocational Training Needs in Oregon's Commercial Fishing Industry" distributed by the State Department of Education:

> "In Oregon, the commercial fishing industry is a major economic factor involving approximately 2000 fishermen and 2500 processing plant workers. It also involves many persons engaged in the distribution and selling of fishing products and other allied industries. The specific number of workers in the industry in Oregon would be very difficult to determine."

Persons interested are encouraged to examine the entire report, which was prepared in 1958 by Bryce Hanning, Research Assistant, Trade and Industrial Education, Oregon State University and G. O. Cannon, Ed.D., Trade and Industrial Education, Oregon State University.

Information provided by the Oregon State Employment Service reveals there are ten shipyards in Oregon employing 1500 people and 26 boatyards employing 110 people. The combined payroll for the third quarter of 1964 was $2,800,000.

In addition to the above there is an ever-increasing number of marinas and moorages. Also, an unspecified but nevertheless appreciable number of individuals are employed by governmental agencies engaged in maritime activities, as shown in the survey returns.

Existing Programs

The original program in Marine Technology as envisaged in this report was established in 1959 by the Maine Technical-Vocational School.

Maine Technical-Vocational School

Location: Portland, Maine

Length of Course: Two years

Continuity of Operation: 1959 to date

Facilities: School facilities at Portland, Maine and 140-foot World War II minesweeper "Aqualab" on loan by U. S. Navy

Curriculum:

	Hours Per Week	
First Semester	Class	Lab.
Navigation I	5	
Marine Engineering I	5	10
Applied Mathematics	5	
Marine Biology	5	
Ship Organization, Maintenance		10
Second Semester		
Navigation II	5	
Marine Engineering II	5	10
Applied Mathematics	5	
Marine Biology	5	
Oceanography	3	2
Fishing Operations		5
Third Semester		
Navigation III	5	
Marine Engineering III	5	10
Physics	3	
Marine Biology	2	2
Fishing Operations		5
Oceanography	3	5
Fourth Semester		
Navigation IV	5	5
Marine Engineering IV	5	10
Physics	3	
Marine Biology	2	
Fishing Operations	2	5
Oceanography	3	5

This program began in 1959 with only four students; twenty the second year; and more applicants (over 100) than the facilities could handle thereafter. Target areas for employment are listed as commercial fishing, fisheries research (aides), fish processing, marinas, boat building and repair, towboating, marine salvage, marine construction and "allied marine vocations."

The success of the Marine Technology school in Maine led the Department of Community Colleges in North Carolina to establish a similar program at the Cape Fear Technical Institute.

Location: Wilmington, North Carolina

Length of Course: Two years

Continuity of Operation: Began in September of 1964

Facilities: Physical properties at Cape Fear Technical Institute and an ex-Navy 180-foot steel vessel converted to research and fishing.

Curriculum:

First Year

- Navigation
- Marine Engineering
- Mathematics
- Marine Biology
- Physics
- Chemistry
- Communicative Skills

Second Year

- Cartography
- Marine Engineering
- Electronics
- Marine Biology
- Oceanography
- Sea Food Processing
- Fishing Operations
- Technical Writing

Aside from classroom studies operations at sea include practical seamanship, navigation, fishing operations, experiments, collection and processing of marine biology and oceanographic data. In marine engineering the student studies internal combustion engines, diesel engines, generators, auxiliary engineering equipment and electricity.

Arthur W. Jordan, Director, reports 18 students in the initial enrollment and that indications are that it will be even more successful than the one at Maine. Capt. Jordan estimates the facilities, when complete, will handle 160 students. Fisheries trade and marine engineering are being considered as alternatives to students lacking higher technical qualifications.

A two-year Fisheries Technician program was very recently inaugurated at Peninsula College, Port Angeles, Washington. Peninsula is a two-year co-educational community college offering courses in the college transfer area and in vocational-technical education as well. The following subjects are included in the curriculum:

Marine Biology
Fisheries--species, propagation,
   feeding, processing, diseases,
   aquariums and trout raising
Elementary Chemistry
Elementary Math & Statistics

Basic Shop
Water Safety
First Aid
Supervisory Training
Report Writing
Office Machines

A fish pond and laboratory on the campus are used for instructional purposes. Impetus to the program was provided by a Kellogg Foundation grant.

A recent Prospectus distributed jointly by the Hawaii Area Office of the U. S. Bureau of Commercial Fisheries and the Hawaii State

Department of Education, describes a proposed Hawaii Fishery Training program. This program contains important elements of the two marine technology programs described above, but concerns itself mostly with commercial fishing.

Curriculum:

First Year	Second Year
Seamanship	Seamanship
Navigation & Piloting	Navigation & Piloting
Fish Catching & Marketing	Fish Catching & Marketing
Diesel	Diesel
Electronics	Electronics
English	English
Social Studies	Mathematics Refresher
Summer on-the-job Training	Summer on-the-job Training

It is of more than passing interest to note in the preface to this Prospectus that the Soviet Union has 19,000 students enrolled in secondary school fishery training programs; Japan has 15,000; and the United States presently offers fishery vocational training to less than 100 high school students.

Elements of Marine Technology training are included in efforts made by other organizations who feel the need. The American Tugboat Association, San Diego, California reports a definite shortage of qualified individuals in the tuna fleet. A possibility suggested by the Association is the development of a training manual in cooperation with the Coast Guard, to be studied by interested individuals to qualify them for marine engineers as they work at other jobs afloat.

Some years ago, the Fishermen's Cooperative Association in San Pedro, California attempted a training program which failed for lack of applicants. The program was designed on the following basis: Retired fishermen, in cooperation with a local junior college, would teach applicants aboard an old fishing vessel. Schooling was to include winches, nets, seamanship, etc.

Certain individual courses available at the Vancouver Vocational Institute, Vancouver, British Columbia may be combined to form some important elements of Marine Technology. These courses are coastal pilotage and related knowledge, home made master (under 350 tons), watchkeeping certificate, chief engineer of a motor driven vessel, first aid course and ship's cooking course.

Various excellent oceanography and fisheries programs as well as merchant marine cadet training are provided at a number of institutions. These are usually of four years duration and lead to professional degrees. They are not an object of this survey in Marine Technology, which confines itself up to and including Associate Degree programs.

* * * * * * * * * * * * *

The foregoing introduction and description of existing programs make apparent the fact that the entire West Coast lacks a training facility presenting Marine Technology as a training program approaching the scope of successful programs on the East Coast.

THE SURVEY

Reasons for Survey

This survey is a manifestation of basic policy within the Vocational-Technical Division at Clatsop Community College that there shall always be, through the years, appraisal of occupational training needs to determine what logically ought to be included among the College vocational-technical curriculums.

Awareness that Marine Technology as a curriculum already exists was acquired through the reading of vocational education journals and subsequent correspondence. It was learned that two existing schools with Associate Degree programs were successfully operating on the East coast, one in Maine and one in North Carolina. Serious consideration was given to the concept of having a Marine Technology program at Astoria for the following reasons:

1. A nucleus for development of new vocational-technical programs exists in courses presently available at Clatsop Community College.

2. Natural features of the Clatsop County area are ideally adapted for maritime training. The Columbia River provides abundant fresh-water inland waterways and the ocean is near at hand, within sight of the College.

3. Man-made maritime installations, wharves, docks, repair yards and governmental installations assure continuous waterfront activity for study.

4. A large, diversified fishing fleet operates out of local ports within the College commuting area.

5. Located at Astoria is the Port of Astoria--with attendant maritime functions. The Port owns and operates a large suction dredge.

6. Within the local population are many persons whose occupational activities are maritime in nature, many of whom are available to assist on advisory committees, with some being available as instructors.

7. There is no two-year school offering Marine Technology on the West coast at this time.

Procedures

Subsequent to acceptance of the research proposal a plan of operation for the survey was evolved which is outlined in essence:

1. Selection of local Advisory Committee--Persons were chosen with various backgrounds of maritime experience to provide an appropriate cross-section of opinions. It was learned that the Astoria area contains a large number of people qualified in these pursuits.

2. Preparation of Questionnaire for Government and Industry--The categories within the field of Marine Technology were selected for coverage. A tentative curriculum was developed as a beginning point for consideration by persons receiving questionnaires. Sections of questionnaire were developed on (a) Student Recruitment and (b) Job Opportunities. Each category was developed in considerable detail by preparation of suitable questions.

3. Preparation of Questionnaire for Circulation at High Schools in Oregon to Determine Student Recruitment Potential

4. Selection of Consultants

5. Orientation Session of Consultants, Project Director and President of Clatsop Community College--The purpose of the session was to introduce concepts of broad scope to the survey.

6. Joint Meeting of local Advisory Committee, Consultants, Project Director and Members of Clatsop Community College Staff--The meeting was held to review the tentative curriculum and to give direction to the entire survey.

7. Completion of Questionnaire in Final Form

8. Preparation of Mailing Lists--High schools in Oregon were available in public listings. A file was prepared of maritime agencies and firms in Oregon in considerable detail, totaling approximately 300 names and addresses. Occupational groups included were (a) Government, Fisheries and Maritime Agencies; (b) Fishermen (Trawl, Troll and Gillnet); (c) Marinas, Moorages and Marine Services; (d) Towboating; (e) Seafood processing; (f) Shipyards and Marine Construction; and (g) Miscellaneous (Shipping Lines, Piloting, etc.).

9. Mailing of Questionnaire

10. Tabulation of Returns

11. Preliminary Analysis of Returns by local Advisory Committee--The analysis was in regard to recruitment and job positions.

12. Preliminary Analysis of Returns by Consultants

13. Meeting of local Advisory Committee with Clatsop Community College Board

14. Analysis of Returns by Project Director--This analysis was in regard to curriculum and the preparation of a Final Report

The survey included two trips by the Project Director. The occasion of the dedication of the new Bureau of Commercial Fisheries Research Laboratory at Seattle, Washington was the first. The trip presented opportunities to view the laboratory situation at Montlake, to confer with Consultant Lee Alverson and to obtain an expression of appropriateness of Marine Technology training from Samuel Hutchinson, Regional Director (favorably inclined). Present at the dedication were Senator Warren Magnuson of Washington, who was the principal speaker, and Senator E. L. Bartlett of Alaska.

The second trip was to participate in an Oceanographic Retreat at Newport, Oregon on April 23 and April 24, 1965, sponsored by the Division of Continuing Education, Oregon State Department of Higher Education. The retreat included lectures, slides, a tour of the oceanographic ship "Yaquina" and a tour of the new laboratory building at Newport.

A third trip by the Project Director, to a School Facilities Conference in Corvallis, Oregon, presented an opportunity for the Director to confer with Consultant Bruce Wyatt on the presentation of Marine Technology survey returns.

It was not deemed germane to the survey to travel to reserve fleet bases outside Oregon to gather cost data on procurement of a vessel suitable for instruction as provided in the research budget. Instead, an investigation was made of the cost of leasing or chartering vessels for presenting instruction in Marine Technology.

Prior to and during the survey, a collection of technical material helpful in conducting the survey and pertinent to Marine Technology education was assembled. These are listed in the bibliography. Included are books, news articles, directories, pamphlets, brochures and other similar material which could comprise the nucleus of a departmental library on the subject. An appreciable amount of informative correspondence is also on file.

Analysis of Returns--Curriculum

For curricular purposes the returns are presented in seven occupational groups with eight curricular categories in each, as presented in the Appendix. The principal immediate use to which this tabulation would be put would be the refinement, modification and alteration of the tentative curriculum. The information compiled is not necessarily procured for immediate analysis and use. Rather, it is sufficiently detailed to provide a source of reference for several years to come.

All occupational groups were questioned on all curricular categories represented. In practice, this resulted in some apparent anomalies.

Extreme cases in point would be a shipyard operator expressing opinions on oceanography, or perhaps a seafood processing plant manager on seamanship. It was decided that this information would nevertheless be useful, i.e., to what extent one occupational category deemed another maritime category should be represented. Where respondents did not feel qualified to comment they often left those sections of the questionnaire blank. Some analytic comments are presented herewith:

Occupational Group--All Groups Combined
Curricular Category--Seamanship

It was gratifying to note safety as a prime area in seamanship training with 93 per cent of all combined categories feeling it absolutely should be taught, with first aid and fire prevention also scoring high percentages. Two schools of thought prevail regarding safety instruction in occupational curriculums. Some feel a course in safety should be taught. Others feel it should be taught with the subject matter in all courses where it is appropriate. The latter method certainly should be effective providing policies are maintained to insure that it will not be forgotten by individual instructors.

Clearly, courses in rigging, knots, splices and cables should be items of instruction. Certain other items not registering high in combined occupational grouping naturally would rate high with specific groups. Yachting customs, sailing, rowing and signaling are items of lowest over-all demand. Cargo-handling, with only 37 per cent responding in the "A" column, nevertheless has strong proponents as a prime curricular item, evidenced by specific returns and letters received during the survey.

Occupational Group--Combined
Curricular Category--Oceanography

Oceanography was included as a separate category for questioning at the recommendation of the Consultants. The breakdown of items within the category is of less significance than the fact that all items with the exception of chemical determination merited strong requests to be included in the program. The possibility exists that chemical determination is too ambiguous a designation to all but an oceanographer. All items showing somewhat lesser responses in the "A" columns maintained substantial entries in the "B" columns (Important, but could be omitted).

Occupational Group--Combined
Curricular Category--Commercial Fishing

United States commercial fisheries face aggressive competition not only in the markets of the world but also in the area of gathering the raw material. The nations of the world view the sea as the answer to their protein deficiencies. Senator Warren Magnuson of Washington and Governor Egan of Alaska are at this time expressing vigorous objections to Japanese fishing operations at the 175° longitude abstention line. Tuna fishermen have in the past fought foreign imports, and very recently a Soviet trawler was test-fishing 12 miles off the Oregon coast. Soviet trawlers already operate extensively on the Bering Sea. Perhaps it is therefore not surprising that although the combined groups scored general education as of small importance, 73 per cent scored history of the fishing industry--foreign and domestic in the "A" column. A need for an awareness of the global picture in commercial fisheries is shown by these returns from individuals.

Preservation of the catch aboard ship and recognition of species were singled out as highly important items of instruction. Techniques of all types of fishing and the handling of gear were naturally considered to be needed instruction. Whaling techniques was an exception. Whaling stations are few in number, although one does operate from Hammond, Oregon at the mouth of the Columbia River.

Evidently there is not a strong feeling that courses on fish propagation in hatcheries and ponds need be taught as a part of this kind of curriculum. Only 18 per cent thought it absolutely should be taught. Forty-three per cent, however, scored it in the "B" column.

Occupational Group--Combined
Curricular Category--Navigation

No other category produced such a strong over-all "A" response as did navigation. The only item not evoking an overwhelming response of "absolutely should be taught" was methods of signaling--Morse code, semaphore. Celestial navigation is not requested as strongly as the other remaining items. The entire gamut of instructional items in operating a boat and knowing its position by other than celestial means is clearly expected by the maritime public in a curriculum in Marine Technology.

Occupational Group--Combined
Curricular Category--Mechanical, Hydraulic, Pneumatic

These items are worthy of comment as representing the composite opinion: Training should be provided in tuning up and maintaining gasoline engines. Overhauling these engines is not considered essential training. Largely, it appears those things should be taught which do not require removing the entire engine from the boat.

Operation and maintenance of diesel engines should be provided for in the curriculum. Overhauling these same engines is not considered necessary in the curriculum.

Steam engines need not be considered.

Mechanical and pipe-fitting operations of many kinds which are done on boats, ships and dredges should be taught.

Operation of winches merits strong consideration with 72 per cent in the "A" column.

> NOTE: Two classes in winch operation have been conducted recently for members of Local 10 of the Longshoreman's Union at San Francisco. Classes were held at the Naval Supply Center, Oakland, California. Eight persons were trained in each class of three days duration. Instruction covered both electric and simulated steam power winches with classroom instruction on setting, rigging and trimming of gear, stresses and strains under various conditions of hoisting, and safety factors.

Oxyacetylene welding is more important to teach than heliarc welding.

Operation of the metal-turning lathe is beyond the point of mechanical training deemed desirable.

Operation and installation of hydraulic equipment should definitely occupy a place in the curriculum. Training is less essential in the area of pneumatic equipment.

Compressors, pumps, heat exchangers and refrigeration equipment should be items of study within the curriculum. The same applies to instruction regarding propellors and shafting.

Turbines and desalting equipment merited low priority in the suggested curricular items.

Occupational Group--Combined
Curricular Category--Electricity and Electronics

In this category of curricular items all merited high returns in the "A" column, although a number shared response with a substantial "B" entry. In analysis, all the electrical and electronics items were usable. It should be pointed out that in electronics, instruction on operation was in much more firm request than was instruction in maintenance and repair. Clearly, the latter would best be served by a trained electronics technician.

Occupational Group--Combined
Curricular Category--Related Training

Related training might be defined as instruction in those things which are not directly of the occupational specialty involved, but which are technical in nature and relative to it. Opinions in this section are quite evenly divided, the only one considered "absolutely should be taught" by over 50 per cent of the respondents being interpretation of drawings and maps. Returns were desultory. Eleven of the 16 items drew a response in the "B" column equal to or greater than that in the "A" column. Marine carpentry and report writing merited some of the stronger responses. Mostly, however, the returns present very little information for positive analysis. The thought is advanced that once we have left the occupational specialty opinions are very diverse as to what else in the curriculum would be most useful.

Occupational Group--Combined
Curricular Category--General Education

The section on general education resembles the section on related training, probably for the same reasons. However, analysis does reveal useful information. As might have been predicted, mathematics is considered important, but only up to calculus. Curiously, knowledge about taxation was not heavily scored. After first aid, English drew the heaviest bid as an item of instruction. Physics and chemistry appeared in demand. It should be safe to presume that the physical and natural sciences as such might well be a part of the curriculum. The returns are random in nature with the "C" column (Helpful, Low Priority), being in marked evidence.

* * * * * * * * * * * * *

Tables in the Appendix present the survey returns by occupational groups and in separate curricular categories. Responses are all converted to percentages. Analysis by individual groups is not practicable as a part of this report. The information, rather, presents a source of reference material for future use.

Analysis of Returns--Potential Students

Concomitant with the survey of government and industry, a brief questionnaire was sent to the high schools in Oregon based on information available at that time (see sample questionnaire in Appendix). Although the timing was inopportune, it being almost the end of the school year, 51 schools reported 264 students who "indicate a liklihood of enrolling in a two-year Associate Degree program in Marine Technology should it become available."

Validity of this figure cannot be readily established, for lack of knowledge as to exactly how the counselors presented the questionnaire in each specific case. Thirty-five of 51 questionnaires returned with positive entries. Not included is one high school in Central Oregon which indicated so large a response (153) that it was eliminated as doubtful data. However, it appears a prudent assumption that there is sufficient interest among high school students to make a program in Marine Technology in sufficient demand to justify its existence.

In the survey of government and industry, three questions were included to obtain a measure of student potential aside from figures available at the high schools. The questions with total responses from 79 questionnaires are presented:

1. How many persons (not high school students) come to you or your organization annually seeking employment who would not be particularly useful with their present abilities but who would be employable after successful completion of two years of training in Marine Technology? Approximately 2588.

2. How many persons working with you or your organization part-time would become employable more months of the year with this training? Approximately 142.

3. In your acquaintanceship, how many persons actually working now do you estimate may be interested in leaving work to take this kind of training if it is offered? Approximately 75.

These estimates, again, assume the level of an informal estimate difficult to substantiate. The large numbers given in the totals, however, are indicative of the probability of enrollment from this source into Marine Technology training.

Analysis of Returns--Job Opportunities

Returns of the survey are presented here, not in the occupational groups of the curriculum section, but in terms of specific kinds of operations and the specific jobs mentioned. Represented are only those firms and agencies indicating anticipated needs. The tabular information is presented in the body of the report as being the most critical section of the entire survey. Forty-six of the 79, or 58 per cent of those reporting listed anticipated needs for persons with Marine Technology training.

MARINE TECHNOLOGY SURVEY
TABULATION OF RETURNS ON JOB OPPORTUNITIES

	Anticipated Needs In:			Possible Advanced Positions In:	
Type of Operation	2 Years	5 Years	Type of Job	2 Years	5 Years
Construction	7	20	Marine, Work on River		
			Lead Man	3	8
			Supt.	2	4

THE SURVEY
-Returns-

	Anticipated Needs In:			Possible Advanced Positions In:	
Type of Operation	2 Years	5 Years	Type of Job	2 Years	5 Years
Shipyard	4	4	Caulker, Wood Vessels		
	10	10	Marine Carpenter		
	40		Steel Worker		
			Foreman	4	
	20	30	Marine Machinist		
	20	30	Marine Electrician		
	5	10	Marine Engineer		
	5	10	Supervisor		
			Ship Supt.	2	5
			Marine Estimator	2	5
			Foreman	3	6
	1	2	Inventory Clerk		
		1	Warehouseman		
	2	4	Allowance Clerk		
			Allow. Coordinator		1
Yacht Construction	4		Ship Carpenter		
Seafood Processing	3		Deckhand		
	6	12	Boat Crew		
			Boat Capt.	3	3
			Boat Engineer		
Shipping Line	1	2	Operating Dept. Employee		
			Stevedoring Dept.	1	2
Oil Company	10	20	Technical Asst.		
	10	20	Engineering Asst.		
			Supt.	5	10
			Foreman	5	10
Logging Company	2		Boom Boat Operator		
Piloting	6		Sailor--Pilot Boat		
			Mate or Master	1	2
Towboating	11	35	Deckhand		
	2		Towboat Operator		
	25		Deck Dept. Employee		
	25		Eng. Dept. Employee		
	2	7	Mechanic		

Type of Operation	Anticipated Needs In: 2 Years	5 Years	Type of Job	Possible Advanced Positions In: 2 Years	5 Years
Towboating, Cont.	20	50	Lift Truck Operator		
	2	7	Shipwright		
			Leadman		2
			Foreman	3	10
Commercial Fishing	14	19	Deckhand (& Netman)		
	1		Engineer		
	5	3	Cook		
	3	3	Engineer & Refrigeration Man		
			Boat Capt.	1	
			Skipper	3	9
Marinas, Charter Service	4	8	Service Dept.		
	3	4	Outboard Mechanic		
			Pleasure Boat Eng. Mechanic	2	4
			Pleasure Boat Carpenter	1	2
			Elec. Equipment Installer	1	2
	4	4	General Maintenance		
	2		Shipwright		
	6		Marine Hardware Sales Ship Chandler		
	1	2	Oil Dock Operator		
	4		Adv. Sales Positions	3	
	6	5	Charter Boat Crew		
			Vessel Operator, Over 20T	2	5
Govt. Fisheries & Maritime Agencies	5	20	Fisheries Technician		
	5	10	Biologist Aide		
	35	50	Vessel Duty--Research		
			Vessel	2	4
	1		Seafood Lab. Tech.		
	5	10	Marine Technician Oceanography Section		
	5	15	Technical (Scientific) Aides		
			Capt., Mate, Eng., Skilled Fisherman, Etc.	5	10
			Scale Reader, Lab. Asst., Field Crew Leader	5	15

Type of Operation	Anticipated Needs In: 2 Years	Anticipated Needs In: 5 Years	Type of Job	Possible Advanced Positions In: 2 Years	Possible Advanced Positions In: 5 Years
Govt. Fisheries & Maritime Agencies, Continued	3	6	Ship Messman		
	2	4	Ordinary Seaman		
	4	8	Marine Wiper		
			Able Seaman	6	12
			Marine Oiler	2	5
			Officer (Deck or Engine)	2	5
	8	26	Marine Technician		
	3	10	Lab. Technician		
	5	12	Seaman		
			Sr. Marine Tech.	1	3
			Sr. Lab. Tech.	1	3
			Vessel Operator	1	2
	1	3	Marine Labor I		
	2	3	Lab. Tech. I		
	1	1	Marine Labor II		
	1	2	Chemist I		
	1	2	Electronics Tech. I		
			Marine Labor II	1	2
			Lab. Tech. II	1	3
			Chemist II	1	2
			Elec. Tech.	1	2
	4	4	Fisheries Aide		
	2	3	Seismic Observer		
			Seismic Spvsr.	1	1
	12	29	Fisheries Technician		
	1	2	Fisheries Aide		
	1	2	Biological Aide		
			Fisheries Method & Equip. Specialist	2	4
			Boat Operator	1	2
			Engineman		2
	-SEASONAL-				
	100-200	250-500	Fish Passage Fishery Aide		
	5	15	Biological Aide		
Stevedoring Company	NOT SPECIFIED		Longshoreman		
			Walking Boss) Supt.) Other Mgmnt.) Position)	NOT SPECIFIED	

Type of Operation	Anticipated Needs In: 2 Years	Anticipated Needs In: 5 Years	Type of Job	Possible Advanced Positions In: 2 Years	Possible Advanced Positions In: 5 Years
Docking Facility	2		Berth Agent		
	2		Maintenance, Equip.		
	2		Crane Operator		
			Terminal Supervisor Or Assistant	1	
			Maintenance Supt.	1	
TOTALS	414	559		82	167

Note: Seasonal work figures not included in TOTALS

Current job vacancies = 16 plus several "yes" entries with no numbers reported

Total No. firms and agencies indicating need for persons	46
Total No. firms and agencies indicating no need for persons	33
Total No. firms and agencies represented	79

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The survey performed was limited with few exceptions to the State of Oregon. Should similar figures be gathered in Washington they should equal or exceed the ones obtained in this survey. Anticipated needs for the Northwest could therefore be doubled.

Conclusions

Conclusions presented are derived from reading, correspondence, study of survey returns, opinions of the local Advisory Committee, the Consultants, members of the College staff and the State Department of Education, and from informal discussion with persons whose practical experience renders acceptance of opinions offered as having genuine application to the subject in hand.

The words "marine technology" can be defined to include a wide variety of areas of instruction. The question may be advanced as to when is instruction marine, and when is it conventional occupational training which can be applied to the marine field? When, for instance, is a mechanic a marine mechanic? Usually, work is marine when it is done for a marine activity in the marine environment. A person who can be called upon to grind valves on the engine of a boat which is afloat is not the same person to whom one takes the family automobile for the same thing. Also, the farmer sees an identifiable area of instruction in farm mechanics. Experts say they should have a knowledge of agriculture. The levity of choices accepted as logical items in a Marine Technology curriculum can be taken to construe both of two concepts which are not really mutually exclusive:

1. Marine Technology training can be expected to encompass several identifiable areas of work.
2. There should be planning by the training facility to keep within reasonable bounds the diversity of training within the curriculum.

Potential students are available on a continuing basis for this kind of training. Recent high school graduates, other persons lacking merchandisable skills, individuals working only part-time and employed persons who wish to avail themselves of upgrading training are present in numbers sufficient to maintain a suitable level of employment. The survey figures may be discounted heavily with the prospect remaining that recruitment of students may be accomplished with sufficient success to sustain a program.

Job opportunities exist for persons completing Marine Technology training. With due allowance that no two-year program of studies could, or even should, attempt to train individuals for all the various jobs listed under "Anticipated Needs" as expressed by the many returns, the figures shown clearly indicate a field of activity which can be reasonably well-defined for which training can be directed. A training program can be devised which is more appropriate than any other training program available in this region for people engaging in this particular discipline.

As is true of many job positions identified as aides or technicians, demand will expand as trainees become available. Much too often scientific personnel are assigned duties which could be performed quite satisfactorily by individuals with Associate Degree level training, releasing the scientist for projects more demanding of his abilities. This has been so in engineering and is likely to be so in fisheries research and oceanography, provided training heretofore not available becomes a reality.

Although the Merchant Marine provides many job positions certainly maritime in nature, inquiry during the survey revealed that promotions are based upon seniority alone, and that a person with marine technology training could not look forward to more rapid advancement. This is not to say that this training would not be valuable to potential merchant seamen nor helpful in obtaining initial entry. Training for engine and deck officers on merchant ships is not properly an objective of Marine Technology education.

Recommendations

In light of the above, the following recommendations are deemed appropriate and are presented herewith:

A two-year Associate Degree program should be instituted as a part of the regular catalog of offerings at Clatsop Community College to begin September, 1965.

The first year of the program may be essentially as presented in the tentative curriculum.

The second year should reflect the information gained during the survey through curricular refinement to be accomplished during the 1965-1966 academic school year. This curriculum refinement should be done with deliberation, by the College staff, with the assistance of a local Advisory Committee in Marine Technology, the State Department of Education and any qualified individuals who may be available for specific inquiry.

Curriculum modification shall include two options in the second year. One should be more vocational in nature, leading to production and performance in the less scientific enterprises. The remaining option should lead to positions of a technical level approaching that of the biological scientist or oceanographer such that graduates may serve in a supporting role as laboratory assistants or scientific aides.

Shipboard instruction should be a feature of the curriculum. Seamanship courses may be presented partly at dockside, but there must be some instruction afloat. Failure to provide instruction afloat would result in an unsatisfactory program. Recruitment into the program would be jeopardized also.

It is recommended that a vessel not be procured at the outset. The cost could prevent a proper division of the educational effort at the College, particularly when no actual enrollment data is available. Rather, it is recommended that arrangements be made with owners of craft within the area for instructional excursions to be made under charter.

It is recommended that existing courses be a part of the curriculum wherever feasible.

Appropriate publicity should be given to the existence of this kind of training to appraise those who might benefit by its availability.

Contact should be maintained with the agencies of industry and government employing persons with this training to keep it truly useful.

The possibility of training for entry into the Merchant Marine should be explored more fully.

SECTION THREE

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APPENDIX

CURRICULUM:

ALL OCCUPATIONAL GROUPS COMBINED

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Curricular Category: SEAMANSHIP

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Rigging	66	22	11	1
Nautical Terms	59	20	18	3
Fibers and Ropes	45	34	20	1
Marine Cables	59	28	11	2
Knots	75	15	9	1
Splices	65	25	9	1
Safety	93	5	1	1
Maintenance--Wood Hulls	50	27	22	1
Maintenance--Metal Hulls	50	27	21	2
Signaling	32	34	26	8
Yachting Customs	5	25	38	32
First Aid	79	13	4	4
Towboat Operation	42	38	17	3
Rowing	22	25	31	22
Sailing	4	19	42	35
Steering, Docking	64	17	5	14
Swimming	60	23	10	7
Boat Building and Repair	27	40	25	8
Merchant Marine Seamanship	45	24	22	9
Fire Prevention and Damage Control	82	11	4	3
U. S. C. G. Regulations	47	23	21	9
Boiler Operation	22	28	23	27
Handling Cargoes	37	27	29	7

KEY: A = Absolutely should be taught
B = Important, but could be omitted
C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Curricular Category: OCEANOGRAPHY

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Waves and Tides	80	13	4	3
Causes and Effects of Currents	71	17	7	5
Oceanographic Instruments	60	19	16	5
Data Plotting	40	29	26	5
Chemical Determination	28	28	29	15
Principles and Use of Underwater Sound	35	30	20	15
Meteorology	44	36	12	8

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C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Curricular Category: COMMERCIAL FISHING

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Hanging and Mending Gill Nets	74	10	11	5
Repairing Trawl Nets and Seines	82	13	5	0
Rigging Crab Pots	62	26	10	2
Gill Net Fishing Techniques	63	25	5	7
Salmon Trolling Techniques	64	26	4	6
Otter Trawl Techniques	72	20	5	3
Crab Fishing Techniques	61	30	8	1
Whaling Techniques	16	30	31	23
Icing and Refrigeration	81	11	8	0
History of Fishing Industry--Foreign & Domestic	23	35	32	10
Preservation of the Catch Aboard Ship	85	13	1	1
Preservation of the Catch--Canning & Freezing	40	23	30	7
Purchasing Fishing Gear	43	34	16	7
Recognition of Species	77	11	10	2
Fish Propagation in Hatcheries and Ponds	18	43	26	13

KEY: A = Absolutely should be taught
B = Important, but could be omitted
C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Curricular Category: NAVIGATION

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Celestial Navigation	46	23	20	11
Coastal Navigation	86	9	1	4
Rules of the Road	95	1	1	3
Aids to Navigation, i.e. Buoys	95	1	1	3
Motor Boat Laws	77	16	4	3
Mariner's Compass as Used in Navigation	88	7	4	1
Nautical Charts--Laying Courses	89	7	3	1
Dead Reckoning	80	13	4	3
Basic Navigational Aspects of Tides and Winds	90	7	0	3
Methods of Signaling--Morse Code, Semaphone	31	38	23	8

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C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Curricular Category: MECHANICAL, HYDRAULIC, PNEUMATIC

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	67	20	12	1
Internal Combustion Engines (Gas) Maintenance	77	13	9	1
Internal Combustion Engines (Gas) Overhauling	26	26	32	16
Internal Combustion Engines (Diesel) Operation and Maintenance	89	9	5	1
Internal Combustion Engines (Diesel) Overhauling	31	23	30	16
Steam Engines--Care and Operation	10	13	43	34
Lining Up Engines to Shaft Couplings	44	26	19	11
Engine Room Piping and Plumbing	52	18	15	15
Deck Winches--Operation	72	21	6	1
Welding--Oxyacetylene	43	36	17	4
Welding--Heliarc	33	27	30	10
Operation of Metal-Turning Lathe	23	20	37	20
Operation of All Basic Machine Shop Equipment	34	21	36	9
Hydraulic Equipment--Operation, Installation	53	29	17	1
Pneumatic Devices--Operation, Installation	38	30	22	10
Winches and Gurdies--Operation, Installation	63	21	13	3
Repair of Outboard Motors	21	29	30	20
Compressors and Pumps	58	23	18	1
Installation, Maintenance and Use of Refrigeration Equipment	51	25	18	6
Installation and Use of Heat Exchangers	46	24	20	10
Desalting Equipment	16	26	36	22
Problems in Use of Propellors, Shafting	48	23	20	9
Turbine--Operation, Maintenance	14	23	32	31

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Curricular Category: ELECTRICITY--ELECTRONICS

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Operation of Marine Electronics Equipment	79	14	6	1
Maintenance and Repair of Marine Electronics Equipment	45	28	23	4
Basic Electricity--Direct, Alternating Current	66	27	5	2
Electric Motors--Maintenance, Light Repairs	60	25	13	2
Batteries--Testing, Maintaining	66	22	9	3
Wiring Up Engines--Marine	50	28	16	6
Installation of Marine Light Wiring Circuits	42	31	20	7
Maintenance of Marine Light Wiring Circuits	63	18	16	3

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B = Important, but could be omitted
C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Curricular Category: RELATED TRAINING

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Drafting	20	28	28	24
Map Making	14	26	35	25
Interpretation of Drawings and Maps	56	27	11	6
Preparation of Written Technical Reports	40	25	16	19
Making of Oral Reports, Short Speeches	30	28	24	18
Use of Slide Rule	22	25	41	12
Galley Cooking	18	24	44	14
Scuba Diving	12	27	39	22
Typing	13	25	43	19
Bookkeeping	24	29	39	8
Selling and Marketing	25	26	30	19
Appraisal of Boats and Marine Equipment	29	29	29	13
Marine Insurance--Types of Policies	25	34	34	7
Meteorology	31	31	28	10
Report Writing	37	29	24	10
Fundamentals of Marine Carpentry	38	27	20	15

KEY: A = Absolutely should be taught
B = Important, but could be omitted
C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Curricular Category: GENERAL EDUCATION

	All Occupational Groups Combined (By Percentages)			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	28	21	32	19
Speed Reading	15	20	44	21
Employer-Employee Relations	38	33	19	10
Applied Economics	25	28	32	15
Introduction to Psychology	19	17	39	25
Psychology of Human Relations	27	28	27	18
Public Speaking	17	28	35	20
Job-Seeking Techniques	32	34	23	11
American Institutions	10	23	41	26
English Fundamentals	51	23	14	12
Fundamentals of Physics	38	38	14	10
Fundamentals of Chemistry	35	31	21	13
Geography	34	27	25	14
Taxation	18	34	31	17
First Aid	83	12	5	0
Mathematics--Up to and Including Algebra and Trigonometry	63	23	8	6
Mathematics--Including Calculus	6	39	26	29

KEY: A = Absolutely should be taught
B = Important, but could be omitted
C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this type of work

CURRICULUM:

GOVERNMENTAL FISHERIES AND MARITIME AGENCIES

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Seamanship

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Rigging	70	26	4	0
Nautical Terms	54	17	29	0
Fibers and Ropes	50	29	21	0
Marine Cables	63	25	12	0
Knots	71	21	8	0
Splices	59	33	8	0
Safety	92	8	0	0
Maintenance, Wood Hulls	55	12	33	0
Maintenance, Metal Hulls	59	8	33	0
Signaling	27	40	21	12
Yachting Customs	4	22	39	35
First Aid	80	8	4	8
Towboat Operation	30	44	22	4
Towboating Deckhand	26	52	13	9
Rowing	25	21	25	29
Sailing	4	8	55	33
Steering, Docking	72	12	4	12
Swimming	48	30	9	13
Boat Building and Repair	17	46	29	12
Merchant Marine Seamanship	50	21	25	4
Fire Prevention and Damage Control	76	12	8	4
U. S. C. G. Regulations	34	25	29	12
Boiler Operation	33	29	21	17
Handling Cargoes	41	38	21	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Oceanography

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Waves and Tides	78	13	9	0
Causes and Effects of Currents	77	14	9	0
Oceanographic Instruments	63	23	14	0
Data Plotting	41	18	41	0
Chemical Determination	32	27	32	9
Principles and Use of Underwater Sound	30	48	13	9
Meteorology	52	38	10	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Commercial Fishing

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Hanging and Mending Gill Nets	66	19	5	10
Repairing Trawl Nets and Seines	71	24	5	0
Rigging Crab Pots	47	32	16	5
Gill Net Fishing Techniques	66	24	0	10
Salmon Trolling Techniques	56	29	5	10
Otter Trawl Techniques	76	19	5	0
Crab Fishing Techniques	52	29	14	5
Whaling Techniques	5	24	38	33
Icing and Refrigeration	68	18	14	0
History of Fishing Industry--Foreign & Domestic	14	38	38	10
Preservation of the Catch Aboard	66	24	5	5
Preservation of Catch--Canning, Freezing	29	29	32	10
Purchasing Fishing Gear	42	29	24	5
Recognition of Species	52	24	19	5
Fish Propagation in Hatcheries & Ponds	10	29	32	29

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Navigation

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Celestial Navigation	42	29	12	17
Coastal Navigation	88	12	0	0
Rules of the Road	92	4	4	0
Aids to Navigation, i.e. Buoys	92	4	4	0
Motor Boat Laws	69	22	9	0
Mariner's Compass as Used in Navigation	92	4	4	0
Nautical Charts--Laying Courses	96	4	0	0
Dead Reckoning	88	12	0	0
Basic Navigational Aspects of Tides & Winds	96	4	0	0
Methods of Signaling--Morse Code, Semaphore	33	38	17	12

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	72	23	0	5
Internal Combustion Engines (Gas) Maintenance	79	17	0	4
Internal Combustion Engines (Gas) Overhauling	23	23	31	23
Internal Combustion Engines (Diesel) Operation and Maintenance	86	9	0	5
Internal Combustion Engines (Diesel) Overhauling	27	23	27	23
Steam Engines--Care and Operation	13	17	39	31
Lining Up Engines to Shaft Couplings	27	41	18	14
Engine Room Piping and Plumbing	53	17	17	13
Deck Winches--Operation	78	22	0	0
Welding, Oxyacetylene	43	43	14	0
Welding, Heliarc	30	30	30	10
Operation of Metal-Turning Lathe	35	17	26	22
Operation of All Basic Machine Shop Equipment	46	29	21	4
Hydraulic Equipment--Operation/Installation	43	43	14	0
Pneumatic Devices--Operation/Installation	39	39	22	0
Winches & Gurdies--Operation/Installation	77	14	9	0
Repair of Outboard Motors	22	44	30	4
Compressors and Pumps	65	26	9	0
Installation/Maintenance/Use of Refrigeration Equipment	55	33	4	8
Installation and Use of Heat Exchangers	41	36	9	14
Desalting Equipment	13	30	40	17
Problems in Use of Propellors/Shafting	57	26	4	13
Turbines--Maintenance/Operation	26	30	22	22

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Electricity--Electronics

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Operation of Marine Electronics Equipment	88	12	4	0
Maintenance and Repair of Marine Electronics Equipment	52	32	16	0
Basic Electricity--Direct/Alternating Current . .	71	29	0	0
Electric Motors--Maintenance/Light Repairs . . .	68	20	12	0
Batteries--Testing/Maintaining	58	23	15	4
Wiring Up Engines--Marine	48	24	20	8
Installation of Marine Light Wiring Circuits . .	29	42	21	8
Maintenance of Marine Light Wiring Circuits . . .	62	21	17	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

General Education

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	29	25	29	17
Speed Reading	4	24	52	20
Employer-Employee Relations	32	36	28	4
Applied Economics	16	32	44	8
Introduction to Psychology	8	20	56	16
Psychology of Human Relations	24	36	32	8
Public Speaking	20	28	36	16
Job-Seeking Techniques	24	44	24	8
American Institutions	8	24	48	20
English Fundamentals	44	20	12	4
Fundamentals of Physics	44	40	12	4
Fundamentals of Chemistry	40	40	16	4
Geography	20	40	32	8
Taxation	4	36	36	24
First Aid	84	12	4	0
Mathematics--Up to & Including Algebra & Trig.	76	20	0	4
Mathematics, Including Calculus	8	20	36	32

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Related Training

	Governmental Fisheries and Maritime Agencies			
	A	B	C	D
Drafting	22	39	26	13
Map Making	17	22	44	17
Interpretation of Drawings and Maps	70	30	0	0
Preparation of Written Technical Reports	47	35	9	9
Making of Oral Reports/Short Speeches	35	35	30	0
Use of Slide Rule	9	39	48	4
Galley Cooking	9	37	48	6
Scuba Diving	9	22	39	30
Typing	9	35	43	13
Bookkeeping	13	26	57	4
Selling and Marketing	26	17	35	22
Appraisal of Boats and Marine Equipment	26	35	26	13
Marine Insurance--Types of Policies	26	26	39	9
Meteorology	39	48	13	0
Report Writing	48	26	26	0
Fundamentals of Marine Carpentry	38	33	21	8

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CURRICULUM:

FISHERMEN--TRAWL, TROLL, GILLNET

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Seamanship

	Fishermen			
	A	B	C	D
Rigging	75	8	17	0
Nautical Terms	42	25	25	8
Fibers and Ropes	50	25	25	0
Marine Cables	67	34	0	0
Knots	100	0	0	0
Splices	100	0	0	0
Safety	92	0	0	8
Maintenance, Wood Hulls	75	17	0	8
Maintenance, Metal Hulls	73	9	9	9
Signaling	25	17	34	17
Yachting Customs	8	17	33	42
First Aid	67	17	8	8
Towboat Operation	33	50	17	0
Towboating Deckhand	42	25	25	8
Rowing	25	17	17	41
Sailing	8	0	33	59
Steering, Docking	66	17	0	17
Swimming	67	17	8	8
Boat Building and Repair	42	33	8	17
Merchant Marine Seamanship	50	17	8	25
Fire Prevention and Damage Control	84	8	0	8
U. S. C. G. Regulations	69	8	8	15
Boiler Operation	8	17	8	67
Handling Cargoes	41	25	17	17

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Oceanography

	Fishermen			
	A	B	C	D
Waves and Tides	73	9	9	9
Causes and Effects of Currents	73	9	0	18
Oceanographic Instruments	73	9	0	18
Data Plotting	36	46	9	9
Chemical Determination	36	19	9	36
Principles and Use of Underwater Sound	44	0	12	44
Meteorology	38	12	12	38

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Commercial Fishing

	Fishermen			
	A	B	C	D
Hanging and Mending Gill Nets	92	0	8	0
Repairing Trawl Nets and Seines	100	0	0	0
Rigging Crab Pots	82	18	0	0
Gill Net Fishing Techniques	82	18	0	0
Salmon Trolling Techniques	75	25	0	0
Otter Trawl Techniques	83	17	0	0
Crab Fishing Techniques	75	25	0	0
Whaling Techniques	25	25	33	17
Icing and Refrigeration	100	0	0	0
History of Fishing Industry--Foreign & Domestic	23	23	39	15
Preservation of the Catch Aboard	100	0	0	0
Preservation of the Catch--Canning/Freezing	42	25	25	8
Purchasing Fishing Gear	42	33	8	17
Recognition of Species	92	0	0	8
Fish Propagation in Hatcheries and Ponds	17	33	33	17

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Navigation

	Fishermen			
	A	B	C	D
Celestial Navigation	42	8	33	17
Coastal Navigation	84	8	0	8
Rules of the Road	92	0	0	8
Aids to Navigation, i.e. Buoys	92	0	0	8
Motor Boat Laws	76	8	8	8
Mariner's Compass as Used in Navigation	92	8	0	0
Nautical Charts--Laying Courses	100	0	0	0
Dead Reckoning	84	8	0	8
Basic Navigational Aspects of Tides & Winds	75	17	0	8
Methods of Signaling--Morse Code, Semaphone	8	42	33	17

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Fishermen			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	60	10	30	0
Internal Combustion Engines (Gas) Maintenance . . .	82	0	18	0
Internal Combustion Engines (Gas) Overhauling . . .	30	10	50	10
Internal Combustion Engines (Diesel) Operation and Maintenance	83	0	17	0
Internal Combustion Engines (Diesel) Overhauling . .	37	27	27	9
Steam Engines--Care and Operation	0	10	40	50
Lining Up Engines to Shaft Couplings	37	18	27	18
Engine Room Piping and Plumbing	55	9	9	27
Deck Winches--Operation	75	8	17	0
Welding, Oxyacetylene	50	17	25	8
Welding, Heliarc	49	17	17	17
Operation of Metal-Turning Lathe	17	8	33	42
Operation of All Basic Machine Shop Equipment . . .	18	18	55	9
Hydraulic Equipment--Operation/Installation	75	8	17	0
Pneumatic Devices--Operation/Installation	46	18	9	27
Winches and Gurdies--Operation/Installation	77	0	15	8
Repair of Outboard Motors	17	17	33	33
Compressors and Pumps	64	9	18	9
Installation, Maintenance, Use of Refrigeration Equipment	69	8	15	8
Installation and Use of Heat Exchangers	55	9	18	18
Desalting Equipment	19	27	27	27
Problems in Use of Propellors/Shafting	49	17	17	17
Turbines--Operation/Maintenance	0	27	27	46

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Electricity--Electronics

	Fishermen			
	A	B	C	D
Operation of Marine Electronics Equipment	91	0	9	0
Maintenance and Repair of Marine Electronics Equipment	70	20	10	0
Basic Electricity--Direct/Alternating Current	54	15	23	8
Electric Motors--Maintenance/Light Repairs	67	17	8	8
Batteries--Testing/Maintenance	67	17	8	8
Wiring Up Engines--Marine	57	27	8	18
Installation of Marine Light Wiring Circuits	58	17	8	17
Maintenance of Marine Light Wiring Circuits	58	17	8	17

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

General Education

	Fishermen			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	25	18	32	25
Speed Reading	0	10	45	45
Employer-Employee Relations	49	17	17	17
Applied Economics	33	42	0	25
Introduction to Psychology	18	18	9	55
Psychology of Human Relations	36	9	9	46
American Institutions	10	10	10	70
Public Speaking	18	27	9	45
Job-Seeking Techniques	27	27	0	46
English Fundamentals	36	9	0	55
Fundamentals of Physics	37	18	9	46
Fundamentals of Chemistry	27	18	9	46
Geography	36	9	9	46
Taxation	27	18	18	37
First Aid	75	8	17	0
Mathematics--Up to and Including Algebra & Trig.	55	18	0	27
Mathematics--Including Calculus	9	27	27	37

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Related Training

	Fishermen			
	A	B	C	D
Drafting	0	50	20	30
Map Making	0	40	30	30
Interpretation of Drawings and Maps	50	30	20	10
Preparation of Written Technical Reports	50	10	30	20
Making of Oral Reports/Short Speeches	30	20	20	30
Use of Slide Rule	40	10	20	30
Galley Cooking	58	25	17	0
Scuba Diving	27	37	27	9
Typing	0	10	50	40
Bookkeeping	36	37	9	18
Selling and Marketing	37	18	27	18
Appraisal of Boats and Marine Equipment	33	25	25	17
Marine Insurance--Types of Policies	38	31	23	8
Meteorology	27	0	46	27
Report Writing	27	18	37	18
Fundamentals of Marine Carpentry	64	18	0	18

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CURRICULUM:

MARINAS, MOORAGES AND MARINE SERVICES

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Seamanship

	Marinas, Moorages & Marine Services			
	A	B	C	D
Rigging	42	25	25	8
Nautical Terms	67	25	0	8
Fibers and Ropes	42	33	25	0
Marine Cables	42	33	17	8
Knots	67	17	8	8
Splices	51	33	8	8
Safety	92	8	0	0
Maintenance, Wood Hulls	50	33	17	0
Maintenance, Metal Hulls	50	33	17	0
Signaling	36	36	28	0
Yachting Customs	17	17	49	17
First Aid	92	8	0	0
Towboat Operation	55	27	9	9
Towboating Deckhand	36	28	36	0
Rowing	17	42	33	8
Sailing	0	50	33	17
Steering, Docking	76	8	8	8
Swimming	59	33	8	0
Boat Building and Repair	25	42	25	8
Merchant Marine Seamanship	42	33	25	0
Fire Prevention and Damage Control	92	8	0	0
U. S. C. G. Regulations	30	50	20	0
Boiler Operation	17	42	25	17
Handling Cargoes	17	25	50	8

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Oceanography

	Marinas, Moorages & Marine Services			
	A	**B**	**C**	**D**
Waves and Tides	84	8	0	8
Causes and Effects of Currents	59	25	8	8
Oceanographic Instruments	58	17	25	0
Data Plotting	50	25	17	8
Chemical Determination	25	33	17	25
Principles and Use of Underwater Sound	27	27	37	9
Meteorology	67	25	0	8

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Commercial Fishing

	Marinas, Moorages & Marine Services			
	A	B	C	D
Hanging and Mending Gill Nets	75	8	17	0
Repairing Trawl Nets and Seines	84	8	8	0
Rigging Crab Pots	59	33	8	0
Gill Net Fishing Techniques	50	33	17	0
Salmon Trolling Techniques	67	25	0	8
Otter Trawl Techniques	67	17	8	8
Crab Fishing Techniques	58	42	0	0
Whaling Techniques	8	33	33	26
Icing and Refrigeration	75	8	17	0
History of Fishing Industry--Foreign & Domestic	8	17	33	42
Preservation of the Catch Aboard	92	8	0	0
Preservation of the Catch--Canning/Freezing	42	25	33	0
Purchasing Fishing Gear	42	33	25	0
Recognition of Species	75	17	8	0
Fish Propagation in Hatcheries and Ponds	33	50	17	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Navigation

	Marinas, Moorages & Marine Services			
	A	B	C	D
Celestial Navigation	50	33	17	0
Coastal Navigation	100	0	0	0
Rules of the Road	100	0	0	0
Aids to Navigation, i.e. Buoys	100	0	0	0
Motor Boat Laws	83	17	0	0
Mariner's Compass as Used in Navigation	92	8	0	0
Nautical Charts--Laying Courses	100	0	0	0
Dead Reckoning	92	0	8	0
Basic Navigational Aspects of Tides and Winds	100	0	0	0
Methods of Signaling--Morse Code, Semaphone	33	42	25	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Marinas, Moorages & Marine Services			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	64	27	9	0
Internal Combustion Engines (Gas) Maintenance . . .	82	9	9	0
Internal Combustion Engines (Gas) Overhauling . . .	27	55	0	18
Internal Combustion Engines (Diesel) Operation and Maintenance	91	9	0	0
Internal Combustion Engines (Diesel) Overhauling .	33	42	8	17
Steam Engines--Care and Operation	17	17	41	25
Lining Up Engines to Shaft Couplings	76	8	8	8
Engine Room Piping and Plumbing	51	33	8	8
Deck Winches--Operation	59	25	8	8
Welding, Oxyacetylene	42	42	8	8
Welding, Heliarc	33	25	25	17
Operation of Metal-Turning Lathe	17	33	42	8
Operation of All Basic Machine Shop Equipment . . .	42	8	42	8
Hydraulic Equipment--Operation/Installation	59	33	0	8
Pneumatic Devices--Operation/Installation	33	25	17	25
Winches & Gurdies--Operation/Installation	47	34	19	0
Repair of Outboard Motors	33	33	17	17
Compressors and Pumps	42	42	17	0
Installation, Maintenance, Use of Refrigeration Equipment	42	25	33	0
Installation and Use of Heat Exchangers	33	34	33	0
Desalting Equipment	25	25	42	8
Problems in Use of Propellors/Shafting	25	50	25	0
Turbines--Operation/Maintenance	25	17	33	25

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Electricity--Electronics

	Marinas, Moorages & Marine Services			
	A	B	C	D
Operation of Marine Electronics Equipment	83	17	0	0
Maintenance & Repair of Marine Electronics Equip.	36	37	18	9
Basic Electricity--Direct/Alternating Current	75	25	0	0
Electric Motors--Maintenance/Light Repairs	50	42	8	0
Batteries--Testing/ Maintaining	83	17	0	0
Wiring Up Engines--Marine	58	42	0	0
Installation of Marine Light Wiring Circuits	51	33	8	8
Maintenance of Marine Light Wiring Circuits	92	0	8	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

General Education

	Marinas, Moorages & Marine Services			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	25	17	58	0
Speed Reading	33	17	50	0
Employer-Employee Relations	33	42	17	8
Applied Economics	25	33	42	0
Introduction to Psychology	36	27	37	0
Psychology of Human Relations	25	33	33	9
Public Speaking	25	33	34	8
Job-Seeking Techniques	50	18	25	7
American Institutions	9	18	64	9
English Fundamentals	66	17	17	0
Fundamentals of Physics	58	25	17	0
Fundamentals of Chemistry	58	9	33	0
Geography	50	25	25	0
Taxation	33	42	25	0
First Aid	92	8	0	0
Mathematics--Up to & Including Algebra and Trig.	58	34	8	0
Mathematics--Including Calculus	17	50	33	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Related Training

	Marinas, Moorages & Marine Services			
	A	B	C	D
Drafting	18	18	37	27
Map Making	9	45	28	18
Interpretation of Drawings and Maps	55	36	9	0
Preparation of Written Technical Reports	18	37	27	18
Making of Oral Reports/Short Speeches	18	36	18	28
Use of Slide Rule	27	27	46	0
Galley Cooking	18	18	64	0
Scuba Diving	19	36	36	9
Typing	36	9	36	19
Bookkeeping	36	36	19	9
Selling and Marketing	18	45	28	9
Appraisal of Boats and Marine Equipment	36	38	38	8
Marine Insurance--Types of Policies	25	42	33	0
Meteorology	25	42	33	0
Report Writing	25	50	17	8
Fundamentals of Marine Carpentry	33	17	42	8

KEY: A = Absolutely should be taught
B = Important, but could be omitted
C = Helpful, but merits only a low priority in selection of subject content offered
D = Not needed at all by persons training for this kind of work

CURRICULUM:

TOWBOATING

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Seamanship

	Towboating			
	A	B	C	D
Rigging	50	50	0	0
Nautical Terms	66	17	17	0
Fibers and Ropes	33	50	0	17
Marine Cables	33	17	50	0
Knots	33	50	17	0
Splices	33	50	17	0
Safety	100	0	0	0
Maintenance, Wood Hulls	50	33	17	0
Maintenance, Metal Hulls	67	33	0	0
Signaling	50	33	17	0
Yachting Customs	0	66	17	17
First Aid	83	17	0	0
Towboat Operation	83	0	17	0
Towboating Deckhand	50	33	17	0
Rowing	0	40	40	20
Sailing	0	40	20	40
Steering, Docking	60	40	0	0
Swimming	80	20	0	0
Boat Building and Repair	50	33	17	0
Merchant Marine Seamanship	50	33	17	0
Fire Prevention and Damage Control	100	0	0	0
U. S. C. G. Regulations	80	0	0	20
Boiler Operation	17	49	17	17
Handling Cargoes	40	0	60	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Oceanography

	Towboating			
	A	B	C	D
Waves and Tides	80	20	0	0
Causes and Effects of Currents	60	20	20	0
Oceanographic Instruments	60	20	20	0
Data Plotting	20	40	40	0
Chemical Determination	20	0	80	0
Principles and Use of Underwater Sound	0	50	25	25
Meteorology	0	75	25	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Commercial Fishing

	Towboating			
	A	B	C	D
Hanging and Mending Gill Nets	100	0	0	0
Repairing Trawl Nets and Seines	100	0	0	0
Rigging Crab Pots	50	50	0	0
Gill Net Fishing Techniques	0	100	0	0
Salmon Trolling Techniques	0	100	0	0
Otter Trawl Techniques	0	50	0	50
Crab Fishing Techniques	0	50	50	0
Whaling Techniques	0	50	0	50
Icing and Refrigeration	50	50	0	0
History of Fishing Industry--Foreign & Domestic	0	100	0	0
Preservation of the Catch Aboard	100	0	0	0
Preservation of Catch--Canning/Freezing	50	50	0	0
Purchasing Fishing Gear	50	50	0	0
Recognition of Species	100	0	0	0
Fish Propagation in Hatcheries & Ponds	50	50	0	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Navigation

	Towboating			
	A	B	C	D
Celestial Navigation	50	25	25	0
Coastal Navigation	50	25	25	0
Rules of the Road	100	0	0	0
Aids to Navigation, i.e. Buoys	100	0	0	0
Motor Boat Laws	100	0	0	0
Mariner's Compass as Used in Navigation	83	17	0	0
Nautical Charts--Laying Courses	67	33	0	0
Dead Reckoning	50	50	0	0
Basic Navigational Aspects of Tides and Winds	83	17	0	0
Methods of Signaling--Morse Code, Semaphone	33	50	17	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Towboating			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	50	50	0	0
Internal Combustion Engines (Gas) Maintenance	50	50	0	0
Internal Combustion Engines (Gas) Overhauling	34	33	33	0
Internal Combustion Engines (Diesel) Operation and Maintenance	83	17	0	0
Internal Combustion Engines (Diesel) Overhauling	50	17	33	0
Steam Engines--Care and Operation	0	0	50	50
Lining Up Engines to Shaft Couplings	57	14	29	0
Engine Room Piping and Plumbing	50	17	33	0
Deck Winches--Operation	83	17	0	0
Welding, Oxyacetylene	33	17	17	33
Welding, Heliarc	40	0	40	20
Operation of Metal-Turning Lathe	20	20	40	20
Operation of All Basic Machine Shop Equipment	20	40	20	20
Hydraulic Equipment--Operation/Installation	40	60	0	0
Pneumatic Devices--Operation/Installation	40	40	0	20
Winches & Gurdies--Operation/Installation	33	50	0	17
Repair of Outboard Motors	17	33	33	17
Compressors and Pumps	50	17	33	0
Installation, Maintenance, Use of Refrigeration Equipment	40	40	0	20
Installation and Use of Heat Exchangers	66	17	0	17
Desalting Equipment	17	33	33	17
Problems in Use of Propellors/Shafting	50	33	0	17
Turbines--Operation/Maintenance	20	20	40	20

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Electricity--Electronics

	Towboating			
	A	B	C	D
Operation of Marine Electronics Equipment	67	33	0	0
Maintenance and Repair of Marine Electronics Equip.	40	20	20	20
Basic Electricity--Direct/Alternating Current	50	50	0	0
Electric Motors--Maintenance/Light Repairs	20	80	0	0
Batteries--Testing/Maintaining	60	40	0	0
Wiring Up Engines--Marine	50	33	17	0
Installation of Marine Light Wiring Circuits	50	33	17	0
Maintenance of Marine Light Wiring Circuits	66	17	17	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

General Education

	Towboating			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	20	40	20	20
Speed Reading	40	40	0	20
Employer-Employee Relations	20	60	0	20
Applied Economics	20	40	20	20
Introduction to Psychology	20	0	20	60
Psychology of Human Relations	20	20	40	20
Public Speaking	40	40	0	20
Job-Seeking Techniques	40	20	40	0
American Institutions	25	50	0	25
English Fundamentals	60	20	20	0
Fundamentals of Physics	80	0	20	0
Fundamentals of Chemistry	40	0	60	0
Geography	20	60	0	20
Taxation	20	60	20	0
First Aid	80	20	0	0
Mathematics--Up to and Including Algebra & Trig.	50	25	25	0
Mathematics, Including Calculus	0	75	0	25

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Related Training

	Towboating			
	A	B	C	D
Drafting	25	50	0	25
Map Making	25	25	25	25
Interpretation of Drawings and Maps	60	40	0	0
Preparation of Written Technical Reports	75	0	0	25
Making of Oral Reports--Short Speeches	0	60	20	20
Use of Slide Rule	25	25	25	25
Galley Cooking	40	20	0	40
Scuba Diving	40	20	0	40
Typing	0	40	60	0
Bookkeeping	0	60	40	0
Selling and Marketing	25	25	0	50
Appraisal of Boats and Marine Equipment	40	20	20	20
Marine Insurance--Types of Policies	25	50	0	25
Meteorology	50	25	0	25
Report Writing	60	40	0	0
Fundamentals of Marine Carpentry	0	25	50	25

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CURRICULUM:

SEAFOOD PROCESSING

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Oceanography

	Seafood Processing			
	A	B	C	D
Waves and Tides	83	17	0	0
Causes and Effects of Currents	67	33	0	0
Oceanographic Instruments	40	20	20	20
Data Plotting	20	60	0	20
Chemical Determination	20	40	20	20
Principles and Use of Underwater Sound	50	17	17	16
Meteorology	50	50	0	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Commercial Fishing

	Seafood Processing			
	A	B	C	D
Hanging and Mending Gill Nets	57	0	29	14
Repairing Trawl Nets and Seines	83	0	17	0
Rigging Crab Pots	66	17	17	0
Gill Net Fishing Techniques	33	34	0	33
Salmon Trolling Techniques	50	33	0	17
Otter Trawl Techniques	50	33	17	0
Crab Fishing Techniques	50	33	17	0
Whaling Techniques	33	33	17	17
Icing and Refrigeration	100	0	0	0
History of Fishing Industry--Foreign and Domestic	67	33	0	0
Preservation of Catch Aboard	100	0	0	0
Preservation of Catch--Canning/Freezing	49	17	17	17
Purchasing Fishing Gear	50	33	17	0
Recognition of Species	100	0	0	0
Fish Propagation in Hatcheries and Ponds	17	83	0	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Commercial Fishing

	Seafood Processing			
	A	B	C	D
Hanging and Mending Gill Nets	57	0	29	14
Repairing Trawl Nets and Seines	83	0	17	0
Rigging Crab Pots	66	17	17	0
Gill Net Fishing Techniques	33	34	0	33
Salmon Trolling Techniques	50	33	0	17
Otter Trawl Techniques	50	33	17	0
Crab Fishing Techniques	50	33	17	0
Whaling Techniques	33	33	17	17
Icing and Refrigeration	100	0	0	0
History of Fishing Industry--Foreign and Domestic	67	33	0	0
Preservation of Catch Aboard	100	0	0	0
Preservation of Catch--Canning/Freezing	49	17	17	17
Purchasing Fishing Gear	50	33	17	0
Recognition of Species	100	0	0	0
Fish Propagation in Hatcheries and Ponds	17	83	0	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Navigation

	Seafood Processing			
	A	B	C	D
Celestial Navigation	33	33	17	17
Coastal Navigation	66	17	0	17
Rules of the Road	83	0	0	17
Aids to Navigation, i.e. Buoys	83	0	0	17
Motor Boat Laws	66	17	0	17
Mariner's Compass as Used in Navigation	83	0	0	17
Nautical Charts--Laying Courses	50	33	0	17
Dead Reckoning	49	17	17	17
Basic Navigational Aspects of Tides and Winds	66	17	0	17
Methods of Signaling--Morse Code, Semaphone	33	50	17	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Seafood Processing			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	57	14	29	0
Internal Combustion Engines (Gas) Maintenance	57	14	29	0
Internal Combustion Engines (Gas) Overhauling	14	29	43	14
Internal Combustion Engines (Diesel) Operation and Maintenance	57	29	14	0
Internal Combustion Engines (Diesel) Overhauling	14	0	72	14
Steam Engines--Care and Operation	14	0	43	43
Lining Up Engines to Shaft Couplings	43	29	14	14
Engine Room Piping and Plumbing	42	29	0	29
Deck Winches--Operation	66	17	17	0
Welding, Oxyacetylene	43	57	0	0
Welding, Heliarc	50	17	33	0
Operation of Metal-Turning Lathe	0	0	67	33
Operation of All Basic Machine Shop Equipment	17	17	49	17
Hydraulic Equipment--Operation/Installation	50	0	50	0
Pneumatic Devices--Operation/Installation	17	33	50	0
Winches and Gurdies--Operation/Installation	72	14	14	0
Repair of Outboard Motors	14	0	29	57
Compressors and Pumps	71	0	29	0
Installation, Maintenance, Use of Refrigeration Equipment	50	17	33	0
Installation and Use of Heat Exchangers	33	34	33	0
Desalting Equipment	0	0	60	40
Problems in Use of Propellors/Shafting	50	0	33	17
Turbines--Operation/Maintenance	0	0	33	67

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Electricity--Electronics

	Seafood Processing			
	A	B	C	D
Operation of Marine Electronics Equipment	80	20	0	0
Maintenance and Repair of Marine Electronics Equip.	40	60	0	0
Basic Electricity--Direct/Alternating Current . . .	43	57	0	0
Electric Motors--Maintenance/Light Repairs	29	57	14	0
Batteries--Testing/Maintaining	50	33	17	0
Wiring Up Engines--Marine	29	29	29	13
Installation of Marine Light Wiring Circuits . . .	29	42	29	0
Maintenance of Marine Light Wiring Circuits	66	17	17	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

General Education

	Seafood Processing			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	33	33	17	17
Speed Reading	0	33	17	50
Employer-Employee Relations	50	17	17	16
Applied Economics	50	17	0	33
Introduction to Psychology	33	34	33	0
Psychology of Human Relations	33	17	17	33
Public Speaking	17	17	33	33
Job-Seeking Techniques	50	33	17	0
American Institutions	0	20	40	40
English Fundamentals	33	33	17	17
Fundamentals of Physics	17	33	33	17
Fundamentals of Chemistry	17	33	17	33
Geography	33	0	50	17
Taxation	33	33	17	17
First Aid	86	14	0	0
Mathematics--Up to & Including Algebra & Trig.	33	34	33	0
Mathematics--Including Calculus	0	50	0	50

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Related Training

	Seafood Processing			
	A	B	C	D
Drafting	0	29	29	42
Map Making	0	14	29	57
Interpretation of Drawings and Maps	0	14	43	43
Preparation of Written Technical Reports	29	0	14	57
Making of Oral Reports--Short Speeches	29	0	43	28
Use of Slide Rule	29	0	43	28
Galley Cooking	0	72	14	14
Scuba Diving	0	29	14	57
Typing	14	29	14	43
Bookkeeping	43	14	29	14
Selling and Marketing	43	29	14	14
Appraisal of Boats and Marine Equipment	33	33	17	17
Marine Insurance--Types of Policies	14	58	14	14
Meteorology	43	29	14	14
Report Writing	29	0	42	29
Fundamentals of Marine Carpentry	33	34	0	33

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CURRICULUM:

SHIPYARDS AND MARINE CONSTRUCTION

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Seamanship

	Shipyards and Marine Construction			
	A	B	C	D
Rigging	83	17	0	0
Nautical Terms	67	33	0	0
Fibers and Ropes	17	50	33	0
Marine Cables	33	50	17	0
Knots	67	17	16	0
Splices	50	33	17	0
Safety	83	17	0	0
Maintenance, Wood Hulls	0	50	50	0
Maintenance, Metal Hulls	0	67	33	0
Signaling	33	50	17	0
Yachting Customs	0	0	50	50
First Aid	50	33	17	0
Towboat Operation	33	67	0	0
Towboating Deckhand	17	50	33	0
Rowing	33	50	0	17
Sailing	17	0	33	50
Steering, Docking	66	17	17	0
Swimming	50	0	50	0
Boat Building and Repair	42	29	29	0
Merchant Marine Seamanship	50	0	50	0
Fire Prevention and Damage Control	50	33	17	0
U. S. C. G. Regulations	50	17	33	0
Boiler Operation	33	0	17	50
Handling Cargoes	33	33	17	17

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Oceanography

	Shipyards and Marine Construction			
	A	B	C	D
Waves and Tides	83	17	0	0
Causes and Effects of Currents	66	17	17	0
Oceanographic Instruments	66	17	17	0
Data Plotting	50	33	17	0
Chemical Determination	17	33	50	0
Principles and Use of Underwater Sound	50	33	17	0
Meteorology	66	0	17	17

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Commercial Fishing

	Shipyards and Marine Construction			
	A	B	C	D
Hanging and Mending Gill Nets	80	0	20	0
Repairing Trawl Nets and Seines	80	20	0	0
Rigging Crab Pots	80	0	20	0
Gill Net Fishing Techniques	80	0	20	0
Salmon Trolling Techniques	80	0	20	0
Otter Trawl Techniques	80	20	0	0
Crab Fishing Techniques	80	20	0	0
Whaling Techniques	40	40	20	0
Icing and Refrigeration	80	20	0	0
History of Fishing Industry--Foreign & Domestic	40	20	40	0
Preservation of Catch Aboard	60	40	0	0
Preservation of Catch--Canning/Freezing	60	0	0	40
Purchasing Fishing Gear	60	40	0	0
Recognition of Species	80	0	20	0
Fish Propagation in Hatcheries and Ponds	20	40	40	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Navigation

	Shipyards and Marine Construction			
	A	B	C	D
Celestial Navigation	60	20	20	0
Coastal Navigation	100	0	0	0
Rules of the Road	100	0	0	0
Aids to Navigation, i.e. Buoys	100	0	0	0
Motor Boat Laws	83	17	0	0
Mariner's Compass As Used in Navigation	83	0	17	0
Nautical Charts--Laying Courses	100	0	0	0
Dead Reckoning	80	20	0	0
Basic Navigational Aspects of Tides and Winds	100	0	0	0
Methods of Signaling--Morse Code, Semaphone	60	20	20	0

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Shipyards and Marine Construction			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	86	14	0	0
Internal Combustion Engines (Gas) Maintenance	100	0	0	0
Internal Combustion Engines (Gas) Overhauling	33	17	50	0
Internal Combustion Engines (Diesel) Operation and Maintenance	100	0	0	0
Internal Combustion Engines (Diesel) Overhauling	33	17	33	17
Steam Engines--Care and Operation	0	17	50	33
Lining Up Engines to Shaft Couplings	57	43	0	0
Engine Room Piping and Plumbing	83	17	0	0
Deck Winches--Operation	67	33	0	0
Welding, Oxyacetylene	66	17	17	0
Welding, Heliarc	17	50	33	0
Operation of Metal-Turning Lathe	50	17	33	0
Operation of All Basic Machine Shop Equipment	50	17	33	0
Hydraulic Equipment--Operation/Installation	66	17	17	0
Pneumatic Devices--Operation/Installation	66	17	17	0
Winches and Gurdies--Operation/Installation	66	17	17	0
Repair of Outboard Motors	0	33	50	17
Compressors and Pumps	66	17	17	0
Installation, Maintenance, Use of Refrigeration Equipment	42	29	29	0
Installation and Use of Heat Exchangers	72	14	14	0
Desalting Equipment	17	33	17	33
Problems in Use of Propellors/Shafting	67	0	33	0
Turbines--Operation, Maintenance	0	33	34	33

KEY:
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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Electricity--Electronics

	Shipyards and Marine Construction			
	A	B	C	D
Operation of Marine Electronics Equipment	66	17	17	0
Maintenance & Repair of Marine Electronics Equip. .	17	50	33	0
Basic Electricity--Direct/Alternating Current . . .	86	0	14	0
Electric Motors--Maintenance/Light Repairs	57	14	29	0
Batteries--Testing/Maintaining	71	29	0	0
Wiring Up Engines--Marine	72	14	14	0
Maintenance of Marine Light Wiring Circuits	50	17	33	0

KEY: A = Absolutely should be taught
B = Important, but could be omitted
C = Helpful, but merits ~~only a low~~ priority in selection of subject content offered
D = Not needed at all by persons training for this kind of work

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

General Education

	Shipyards and Marine Construction			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	50	0	33	17
Speed Reading	20	20	60	0
Employer-Employee Relations	60	20	20	0
Applied Economics	40	0	20	40
Introduction to Psychology	40	20	0	40
Psychology of Human Relations	40	40	0	20
Public Speaking	40	0	60	0
Job-Seeking Techniques	20	60	20	0
American Institutions	20	40	40	0
English Fundamentals	80	0	20	0
Fundamentals of Physics	20	80	0	0
Fundamentals of Chemistry	20	80	0	0
Geography	60	20	20	0
Taxation	40	20	40	0
First Aid	50	50	0	0
Mathematics--Up to & Including Algebra & Trig.	83	17	0	0
Mathematics--Including Calculus	0	50	33	17

KEY: A = Absolutely should be taught
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D = Not needed at all by persons training for this kind of work

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Related Training

	Shipyards and Marine Construction			
	A	B	C	D
Drafting	83	0	0	17
Map Making	33	17	33	17
Interpretation of Drawings and Maps	83	0	17	0
Preparation of Written Technical Reports	33	50	0	17
Making of Oral Reports--Short Speeches	50	33	17	0
Use of Slide Rule	33	17	50	0
Galley Cooking	17	0	83	0
Scuba Diving	0	0	100	0
Typing	17	33	50	0
Bookkeeping	33	17	50	0
Selling and Marketing	17	33	50	0
Appraisal of Boats and Marine Equipment	33	34	33	0
Marine Insurance--Types of Policies	17	50	33	0
Meteorology	20	60	0	20
Report Writing	20	60	0	20
Fundamentals of Marine Carpentry	58	14	14	14

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D = Not needed at all by persons training for this kind of work

CURRICULUM:

MISCELLANEOUS--SHIPPING LINES AND PILOTING

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Seamanship

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Rigging	100	0	0	0
Nautical Terms	86	14	0	0
Fibers and Ropes	72	14	14	0
Marine Cables	72	14	14	0
Knots	86	14	0	0
Splices	86	0	14	0
Safety	100	0	0	0
Maintenance, Wood Hulls	14	72	14	0
Maintenance, Metal Hulls	14	72	14	0
Signaling	43	29	28	0
Yachting Customs	0	43	43	14
First Aid	100	0	0	0
Towboat Operation	43	57	0	0
Towboating Deckhand	43	43	14	0
Rowing	29	29	42	0
Sailing	0	29	57	14
Steering, Docking	57	29	14	0
Swimming	86	0	0	14
Boat Building and Repair	14	29	43	14
Merchant Marine Seamanship	57	14	29	0
Fire Prevention and Damage Control	100	0	0	0
U. S. C. G. Regulations	57	0	43	0
Boiler Operation	14	14	72	0
Handling Cargoes	43	14	43	0

KEY: A = Absolutely should be taught
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D = Not needed at all by persons training for this kind of work

APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Oceanography

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Waves and Tides	86	14	0	0
Causes and Effects of Currents	86	14	0	0
Oceanographic Instruments	42	29	29	0
Data Plotting	43	14	43	0
Chemical Determination	29	42	29	0
Principles and Use of Underwater Sound	43	14	29	14
Meteorology	43	14	43	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE

OF

CURRICULAR ITEMS

Commercial Fishing

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Hanging and Mending Gill Nets	67	33	0	0
Repairing Trawl Nets and Seines	67	33	0	0
Rigging Crab Pots	67	33	0	0
Gill Net Fishing Techniques	100	0	0	0
Salmon Trolling Techniques	100	0	0	0
Otter Trawl Techniques	100	0	0	0
Crab Fishing Techniques	100	0	0	0
Whaling Techniques	33	34	33	0
Icing and Refrigeration	100	0	0	0
History of Fishing Industry--Foreign and Domestic	33	34	33	0
Preservation of Catch Aboard	100	0	0	0
Preservation of Catch--Canning/Freezing	33	34	33	0
Purchasing Fishing Gear	33	67	0	0
Recognition of Species	100	0	0	0
Fish Propagation in Hatcheries & Ponds	0	67	33	0

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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Navigation

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Celestial Navigation	57	29	0	14
Coastal Navigation	86	0	0	14
Rules of the Road	100	0	0	0
Aids to Navigation, i.e., Buoys	100	0	0	0
Motor Boat Laws	71	29	0	0
Mariner's Compass as Used in Navigation	72	14	14	0
Nautical Charts--Laying Courses	71	0	29	0
Dead Reckoning	72	14	14	0
Basic Navigational Aspects of Tides & Winds	100	0	0	0
Methods of Signaling--Morse Code, Semaphone	33	17	33	17

KEY: A = Absolutely should be taught
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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Mechanical, Hydraulic, Pneumatic

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Internal Combustion Engines (Gas) Tuning Up	67	0	33	0
Internal Combustion Engines (Gas) Maintenance	83	0	17	0
Internal Combustion Engines (Gas) Overhauling	33	17	33	17
Internal Combustion Engines (Diesel) Operation and Maintenance	83	0	17	0
Internal Combustion Engines (Diesel) Overhauling	33	17	33	17
Steam Engines--Care and Operation	17	17	50	16
Lining Up Engines to Shaft Couplings	33	17	50	0
Engine Room Piping and Plumbing	33	17	33	17
Deck Winches--Operation	67	33	0	0
Welding, Oxyacetylene	17	33	50	0
Welding, Heliarc	50	0	50	0
Operation of Metal-Turning Lathe	50	0	50	0
Operation of All Basic Machine Shop Equipment	17	17	50	16
Hydraulic Equipment--Operation/Installation	33	17	50	0
Pneumatic Devices--Operation/Installation	17	33	50	0
Winches & Gurdies--Operation/Installation	33	50	17	0
Repair of Outboard Motors	33	17	33	17
Compressors and Pumps	33	34	33	0
Installation, Maintenance, Use of Refrigeration Equipment	33	17	33	17
Installation and Use of Heat Exchangers	33	0	50	17
Desalting Equipment	17	17	33	33
Problems in Use of Propellors/Shafting	33	0	67	0
Turbines--Operation/Maintenance	17	0	66	17

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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

Electricity--Electronics

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Operation of Marine Electronics Equipment	58	14	14	14
Maintenance & Repair of Marine Electronics Equip.	29	14	43	14
Basic Electricity--Direct/Alternating Current	71	29	0	0
Electric Motors--Maintenance/Light Repairs	56	16	28	0
Batteries--Testing/Maintaining	72	14	14	0
Wiring Up Engines--Marine	42	29	29	0
Installation of Marine Light Wiring Circuits	29	14	57	0
Maintenance of Marine Light Wiring Circuits	29	42	29	0

KEY: A = Absolutely should be taught
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APPENDIX

ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE
OF
CURRICULAR ITEMS

General Education

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Labor Laws, Unions and Labor Legislation	29	43	14	14
Speed Reading	43	0	43	14
Employer-Employee Relations	29	43	14	14
Applied Economics	14	0	72	14
Introduction to Psychology	14	0	72	14
Psychology of Human Relations	14	29	43	14
Public Speaking	14	14	58	14
Job-Seeking Techniques	29	29	42	0
American Institutions	17	17	49	17
English Fundamentals	43	14	29	14
Fundamentals of Physics	43	29	14	14
Fundamentals of Chemistry	43	14	29	14
Geography	43	14	29	14
Taxation	0	29	57	14
First Aid	100	0	0	0
Mathematics--Up to and Including Algebra & Trig.	57	14	29	0
Mathematics--Including Calculus	0	57	0	43

KEY:
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ASSIGNMENT OF PERCENTAGE WEIGHTS TO INDICATE RELATIVE IMPORTANCE OF CURRICULAR ITEMS

Related Training

	Miscellaneous Shipping Lines & Piloting			
	A	B	C	D
Drafting	14	14	43	29
Map Making	14	14	43	29
Interpretation of Drawings and Maps	43	14	29	14
Preparation of Written Technical Reports	43	14	29	14
Making of Oral Reports--Short Speeches	43	14	14	29
Use of Slide Rule	14	29	43	14
Galley Cooking	0	14	43	43
Scuba Diving	0	43	57	0
Typing	14	14	58	14
Bookkeeping	17	17	49	17
Selling and Marketing	0	29	42	29
Appraisal of Boats and Marine Equipment	0	14	57	29
Marine Insurance--Types of Policies	0	14	72	14
Meteorology	14	29	43	14
Report Writing	43	14	29	14
Fundamentals of Marine Carpentry	14	43	14	29

KEY:
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HIGH SCHOOL SURVEY QUESTIONNAIRE

APPENDIX
-High School Questionnaire-

COPY

Dear Educator:

Your cooperation is urgently needed with a survey which is being conducted by this institution in cooperation with the Oregon State Department of Education and the U. S. Office of Education to determine the feasibility of there being established in Oregon a two-year program in Marine Technology. Featured are both shipboard and shore-side training.

Realizing the lateness of the hour, it is nevertheless hoped that some measure of the number of potential students interested in such a program be obtained. It is to this end that we respectfully appeal for your immediate cooperation.

Job positions toward which this training will be directed include among others the following:

Independent fisherman
Crewman on fishing vessel
Mechanic or crewman on dredge
Deckhand on launch or towboat
Shipwright apprentice
Shipwright's helper
Technician in oceanography
Assistant to marine biologist
Marina employee or operator
Mechanical or deck assistant aboard a ferry boat
Specialized mechanic aboard an oil exploration vessel
Marine engine installation and repair mechanic
U. S. Coast and Geodetic Survey technician
U. S. Bureau of Fisheries Research technician
Marine biology aide--State Fish Commission
Crewmember--weather station or lightship
Seafood cannery technician
Marine hardware salesman
Offshore well-drilling mechanic
Log boom-boat operator
Stevedore
Marine insurance agent
Marine engine salesman
Floating-cannery hand

A curriculum is being prepared to meet the training requirements involved.

Please indicate below the number of students at your school who evidence interest in taking advantage of the presentation of this kind of program, should it become available.

NAME OF HIGH SCHOOL____

APPROXIMATELY__________(Number) students indicate a likihood of enrolling in a two-year Associate Degree program in Marine Technology should it become available.

Paul Tolonen, Project Director
Marine Technology Survey

GOVERNMENT AND INDUSTRY
SURVEY QUESTIONNAIRE

FEASIBILITY SURVEY
FOR PRESENTATION OF A
CURRICULUM IN MARINE TECHNOLOGY

by

CLATSOP COLLEGE

in cooperation with

THE OREGON STATE DEPARTMENT OF EDUCATION

and

THE U.S. OFFICE OF EDUCATION

Astoria, Oregon
April 1965

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INTRODUCTION

A goal of Vocational-Technical education is to be responsive to the current and changing manpower needs of business and industry. Training requirements for persons in new jobs, as well as the preparation required for the mutations constantly developing in existing jobs, must therefore be under periodic surveillance. Congress has seen fit to provide financial assistance to the states so that factual surveys can be conducted to provide the occupational information necessary to enable educational institutions to maintain curriculums which are compatible with, and in support of, the real needs of business and industry.

Sponsorship of this survey is shared by Clatsop College, the Oregon State Department of Education and the Federal Government through provisions of Public Law 88-210. Personal assistance aside from the college staff is provided by a local advisory committee, each of whom is expert in some aspect of maritime activity. In addition, three consultants have been engaged from the state at large whose point of observation in maritime matters will provide wider scope to the survey.

OBJECTIVES

The objectives of the survey as expressed in the Research Proposal are:

PART ONE: (Survey of Need)

1. To determine the job opportunities in marine technology
2. To measure the reservoir of potential students
3. To develop a tentative general curriculum

PART TWO: (Refinement Procedures)

1. To improve and refine the curriculum based on findings in Section One
2. To develop a proposal for financing a marine technology program
3. To determine the extent of available existing instructional facilities for operation of a program of this type
4. To determine the probable cost of providing suitable properties appropriate for providing shipboard instruction

Mechanics of conducting a survey are such that there will be overlapping activity between Parts I and II. It is hoped that the survey can be completed, results of the survey analyzed, and the curriculum refined during the spring months of 1965. Thus, should a program of this type be promulgated for the 1965-1966 school year, there will be ample time for prospective students to become aware of the existence of this program in marine technology, and scheduling of the courses to be accomplished by the institution as well.

TENTATIVE CURRICULUM

Following is presented a tentative curriculum which is intended to serve as a catalyst inducing reaction, suggestions or approval from the various respondents to whom survey questionnaires are presented. It is intended as a point of beginning. Revision of this curriculum will be based upon the findings of the survey itself, and upon suggestions of the Advisory Committee and the Consultants.

Results of the study will be kept as permanent records to serve as a guide through a number of years should a new college offering evolve from this study. The possibility exists that many excellent suggestions would not be economically feasible at the outset, but would be strong possibilities in future years. To effect economy of operation it is usually necessary to use existing courses and instructors as much as possible in new programs, particularly when initial enrollments may be small.

Existing Associate Degree programs in electronics, drafting and industrial mechanics provide many of the elements useful in marine technology and can of themselves, in some cases, provide suitable persons for these jobs.
The Tentative Marine Technology Curriculum presented herewith contains all elements currently required for awarding the Associate Degree.

MARINE TECHNOLOGY CURRICULUM

FIRST TERM FALL

COURSE (Existing courses indicated by No.)	NUMBER	TERM UNITS	CLASS HRS. PER WEEK	(PER WEEK) LAB HRS.	TOTAL HOURS
Communication Skills	1.100	3	3	-	3
Mathematics* (Determined by Placement)	4.200	3	3	-	3
Seamanship	- - -	4	1	8	9
First Aid	5.214	1	-	2	2
Bench & Shop Practices	4.164	4	3	3	6
P.E.	190	1	-	2	2
Orientation	0.502	1	-	-	1
Totals		17	10	15	26

SECOND TERM WINTER

COURSE (Existing courses indicated by No.)	NUMBER	TERM UNITS	CLASS HRS. PER WEEK	LAB HRS. PER WEEK	TOTAL HOURS
Communication Skills	1.102	3	3	-	3
Mathematics	4.202	3	3	-	3
Seamanship	- - -	4	1	8	9
Practical Physics	4.300	4	3	2	5
Welding Fundamentals	4.152	3	1	3	4
P.E.	190	1	-	2	2
Totals		18	11	15	26

THIRD TERM SPRING

COURSE (Existing courses indicated by No.)	NUMBER	TERM UNITS	CLASS HRS. PER WEEK	LAB HRS. PER WEEK	TOTAL HOURS
Practical Physics	4.302	4	3	2	5
Navigation	- - -	4	3	3	6
Seamanship	- - -	4	1	8	9
Employer-Employee Relations	1.500	2	2	-	2
Health Education	1.605	2	2	-	2
Electrical Equipment	- - -	2	1	2	2
Totals		18	11	13	26

FOURTH TERM FALL

COURSE (Existing courses indicated by	NUMBER No.)	TERM UNITS	CLASS HRS. PER WEEK	LAB HRS. PER WEEK	TOTAL HOURS
Practical Physics	4.303	4	3	2	5
Commercial Fishing Techniques	- - -	2	-	4	4
Marine Biology	- - -	4	3	3	6
Introduction to Business	2.502	3	3	-	3
Power Systems	3.360	3	2	4	6
P.E.	190	1	-	2	2
Totals		17	11	15	26

FIFTH TERM WINTER

COURSE (Existing courses indicated by	NUMBER No.)	TERM UNITS	CLASS HRS. PER WEEK	LAB HRS. PER WEEK	TOTAL HOURS
Marine Biology	- - -	4	3	3	6
Boat Maintenance & Repair	- - -	3	1	4	5
Seafood Marketing & Processing	- - -	3	3	-	3
American Institutions	1.600	3	3	-	3
Mechanical Systems	3.315	4	3	3	6
P.E.	190	1	-	2	2
Totals		18	13	12	25

SIXTH TERM SPRING

COURSE (Existing courses indicated by	NUMBER No.)	TERM UNITS	CLASS HRS. PER WEEK	LAB HRS. PER WEEK	TOTAL HOURS
Applied Oceanography	- - -	3	-	8	8
Chemistry	- - -	4	3	2	5
Technical Report Writing	6.126	3	3	-	3
Hydraulic & Pneumatic Systems	3.342	3	2	3	5
Elective*	- - -	3	-	-	3-6
P.E.	190	1	-	2	2
Totals		17	(Total hours determined by elective)		26-29

*Possible Electives: Scuba Diving, Galley Cooking, General Education Course.

Comments or Suggestions:

CURRICULUM OBJECTIVES

General Aims

The curriculum in Marine Technology would consist of an integrated series of courses designed to accommodated the requirements of persons who intend to gain sufficient training to become employable at beginning positions in any one of a family of job opportunities. These positions will vary widely in specific requirements, but do have certain basic elements in common. Among these are a knowledge of the terms used in maritime circles, familiarity with boats and dockside activities, and proficiency with those basic skills in mathematics, mechanics, physics and electricity which are applicable in a variety of maritime job opportunities.

Some examples of jobs towards which this training will be directed include the following:

Independent fisherman
Crewman on fishing vessel
Mechanic or crewman on dredge
Deckhand on launch or towboat
Mechanical or deck assistant aboard ferry boat
Specialized mechanic aboard oil exploration vessel
Marine engine installation and repair mechanic
Shipwright apprentice
Shipwright's helper
Technician in oceanography
Assistant to marine biologist
U.S. Coast and Geodetic Survey technician
U.S. Bureau of Fisheries Research technician
Marina employee or operator
Offshore well-drilling mechanic
Log boom-boat operator
Stevedore
Floating-cannery technician
Marine insurance agent
Marine engine salesman
Marine hardware salesman
Seafood cannery technician
Marine biology aide - State Fish Commission
Crewmember, weather station or lightship

This curriculum can be designed and periodically refined to give students from year to year opportunity for acquisition of knowledge and skills needed for various entry occupations in marine activity. Anticipated is the probability that the trainee-graduate will continue by virtue of on-the-job training experiences, and supplemental technical education when feasible, to positions of higher technical levels. Problem-solving techniques, basic skills and fundamental knowledge will be emphasized to assure adaptability and flexibility in the world of work.

Included in the curriculum should be courses in general education intended to guide students in the amenities proved to be useful to persons in fitting themselves into the job situation as they find it, and into the entire social community as well. A specified amount of this type of courses is necessary in programs leading to the Associate Degree. Their value is of primary significance.

The objective is not to attempt a scaled-down version of professional training in fisheries or oceanography. Rather, what is contemplated is a well-planned two-year program at the technician or aide level. It is expected these persons will in many cases serve the supporting role to the professional which is currently successful and desirable in, for instance, engineering, forestry and electronics. Where the professions are not featured, graduates will seek their own competitive level. In other cases they may become individual business operatore trained to have better chances to succeed.

Suggested Specific Objectives

After successful completion of the program of studies the student would have been presented opportunities to:

Feel at ease aboard vessels, both large and small, sufficiently well to begin as an efficient crewmember in this respect.

Discover whether seasickness presents to him an inconquerable problem.

Learn how to perform in the many aspects of practical seamanship and boat handling.

Know what needs to be done to maintain boats and docks in condition and to be able to perform many of these maintenance operations.

Solve practical problems involving knowledge of the physical sciences and fundamental mathematics in support of job performances.

Understand coastal navigation and Rules of the Road.

Learn how to operate instruments such as radio, loran and depth finders.

Use and develop his ability to grasp the meaning of instructions, both oral and written, as well as to communicate his ideas to others.

Work as part of a crew where individual ideas must be compromised on occasion for optimum group efficiency.

Become educated in the supporting role often occupied by technicians in complementing the realm of activity occupied by the professional in creating an effective "team" situation.

Learn fishing techniques as actually practiced by West Coast fisherman. This would include methods of harvesting the various fishes as well as crabs, oysters, shrimp and whales, and essential instruction in handling the catch.

Acquire knowledge of sales techniques particularly as applied to marinas.

Make minor adjustments on internal combustion engines in order to get them to start and to run properly.

Know the importance of constantly observing safety procedures in the execution of job assignments.

Develop a feeling of pride and competency in himself as a member of the waterfront fraternity.

EXISTING MARINE TECHNOLOGY PROGRAMS

Currently there are two schools in the United States offering two-year curriculums in Marine Technology. The first of these was founded at the Maine Vocational-Technical Institute in South Portland, Maine in 1959. Courses presented in two semesters per year include:

- Navigation I, II, III and IV
- Marine Engineering L, II, III and IV
- Applied Mathematics I and II
- Marine Biology I, II, III and IV
- Ship Organization and Maintenance I
- Oceanography L, II and III
- Fishing Operations I, II and III
- Physics I and II

Presently facilities can handle 40 students per year. More than 100 apply.

The second school in Marine Technology was established as a sequel to that in Maine. It is operated by the North Carolina community college system at Cape Fear Technical Institute, Wilmington, North Carolina. This program is in its first year, having begun in September 1964.

Courses offered are:

- Navigation
- Marine Engineering
- Mathematics
- Marine Biology
- Physics
- Chemistry
- Communication Skills
- Cartography
- Electronics
- Oceanography
- Sea Food Processing
- Fishing Operations
- Technical Writing

Presently there are no schools of this type on the West Coast.

CHRONOLOGY OF PRECEDING EVENTS

Attention to the fact that marine technology training as such did indeed exist, came as a result of an article in the April 1964 edition of the American Vocational Journal describing the successful program at the Maine Vocational-Technical Institute. Informal questioning of key persons in the Astoria area revealed genuine interest of a positive nature.

Based on the assumption that a school of this type serves a larger area than many other programs do, it was deemed appropriate to call a preliminary meeting of persons selected from a wider geographical area than that normally served by the college. President Richard Boss of Clatsop College invited a group to meet at the college on December 1, 1964. The response was encouraging in that nearly all persons contacted did actually attend. An expression of views was solicited from each one present.

The Oregon State Department of Education was represented by Dr. William Loomis, who suggested a feasibility survey in greater depth, with the possibility that research funds might become available for part of the cost of the survey. The persons gathered concurred that an appropriate investigation of facts be performed.

A Research Proposal was prepared at Clatsop College, submitted to the State Department of Education, and approved on March 10, 1965. Paul Tolonen, of the college staff, was named Project Director. The initial meeting of the local advisory committee was held March 11, 1965 and work promptly began on the questionnaire presented herewith. Three consultants were selected, with the first meeting scheduled at Astoria the afternoon of April 14, followed by a joint session with the local Advisory Committee in the evening.

Persons attending preliminary meeting:

NAME	POSITION *
Dr. William G. Loomis	State Department of Education
Richard D. Boss	Clatsop College
Joseph M. Dyer	Astoria Marine Construction Company
Harold W. Doan	Coast Guard Base
Henry Hoeye	Salvage Chief
Charles Dymond	Clatsop College
Stanley Hansen	Maritime Administration
Elmer W. Copstead	U.S. Bureau of Commercial Fisheries
Harvey L. Moore	U.S. Bureau of Commercial Fisheries
Cdr. R. E. Young	U.S. Coast Guard Station
A. J. Conger	Otter Trawl Commission
Walter Gadsby	States Steamship Company
Fred Wolleson	Tuna Fisherman
Arthur Anderson	President Fisherman's Marketing Association
Kenneth Olson	Alaska Fishermen's Union
Richard Carruthers	Bioproducts
Deskin O. Bergey	Pacific Power and Light Company
Donald A. Edy	Knappton Towboat Company
Dick Bettendorf	Port of Astoria
Frank J. Bertinchamps	Corps of Engineers
J. E. Shelver	Corps of Engineers
Art Paquet	Otter Trawl Commission
Paul Tolonen	Clatsop College
Don Morgan	Clatsop College

Local Advisory Committee:

NAME	POSITION *
Capt. Edgar Quinn	Columbia River Pilots
Mr. Harold W. Doan	U.S. Coast Guard
Mr. Arthur Anderson	President Fisherman's Marketing Association
Mr. Richard Carruthers, Jr.	Bioproducts, Inc.
Mr. Donald Edy	Knappton Towboat Company
Mr. Elmer Copstead	Bureau of Commercial Fisheries
Mr. Robert Loeffel	Oregon State Fish Commission
Mr. Paul Tolonen	Clatsop College - Chairman, Vocational-Technical Division

Consultants:

NAME	POSITION *
Mr. Lawrence Barber	Marine Editor, The Oregonian, Portland
Mr. Bruce Wyatt	Oregon State University, Corvallis
Mr. Lee Alverson	Bureau of Commercial Fisheries, Seattle Washington

* Persons named do not necessarily represent the organization listed.

CLATSOP COLLEGE

ASTORIA, OREGON

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ANALYSIS INTERVIEW FORM

For a Proposed

MARINE TECHNOLOGY PROGRAM

* * * * * * * * * * * * *

Name of Person Contacted____________________________ Date_______________

Name of Firm or Agency____

Address of Firm or Agency____

Formal Position or Job Title of Person Interviewed____________________

____

* WE WOULD APPRECIATE THE RETURN OF THE BLUE QUESTIONNAIRE WITHIN ONE WEEK

This survey is being conducted by Clatsop College in conformity with terms of a Research Proposal submitted to the State Director of Vocational Education. Incorporated are suggestions by the Trade and Industrial Section, State Department of Education, the local Advisory Committee on Marine Technology, and Consultants from broader aspects of the industry. The purpose is to ascertain the degree of desirability for such a program in practical terms.

Your cooperation in answering this questionnaire is essential in keeping the college oriented to the training and manpower needs within its scope of assistance. You may rest assured that the information you offer will be confidential. Neither your firm nor specific information regarding it will be identified in any way in the final report.

QUESTIONNAIRE SECTIONS

CURRICULUM

The following sections are presented to obtain guidelines in planning a curriculum for Marine Technology. Please use the following key for all sections encircling the letter which most nearly expresses your opinion relative to the usefulness of each of the items were it to be included in the curriculum. Usefulness may be defined in answer to the question: Will instruction in this area make a person more acceptable in gaining and holding employment in maritime job positions?

KEY: A - Absolutely should be taught.

B - Important, but could be omitted.

C - Helpful. Merits only a low priority in slection of subject content offered.

D - Not needed at all by persons training for this kind of work.

* *

Seamanship

Circle one

A B C D 1. Techniques of Rigging - sheaves and blocks

A B C D 2. Nautical terms

A B C D 3. Fibers and ropes - care, composition and strength

A B C D 4. Handling marine cables

A B C D 5. Knots

A B C D 6. Splices

A B C D 7. Safety practices at ship and dock

A B C D 8. Maintenance (including painting) of wood hulls

A B C D 9. Maintenance (including painting) of metal hulls

A B C D 10. Methods of signalling

Seamanship (Continued)

Circle one

A B C D 11. Yachting customs and etiquette

A B C D 12. First Aid

A B C D 13. Towboat operator techniques

A B C D 14. Duties of the towboating deckhand

A B C D 15. Rowing

A B C D 16. Sailing

A B C D 17. Steering and docking smaller vessels

A B C D 18. Swimming

A B C D 19. Boat building and repairing

A B C D 20. Marchant marine seamanship

A B C D 21. Fire prevention and damage control - use of equipment

A B C D 22. U.S.C.G. Regulations for charter vessels

A B C D 23. Boilers - operating precautions

A B C D 24. Loading and unloading cargoes

Additions and comments____

____

Oceanography

A B C D 1. Waves and Tides

A B C D 2. Causes and effects of currents

A B C D 3. Oceanographic instruments

A B C D 4. Data plotting

A B C D 5. Chemical Determination

KEY:
A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

Oceanography (Continued)

Circle one

A B C D 6. Principles and use of underwater sound

A B C D 7. Meteorology

Additions and comments:____

____

Commercial Fishing

Circle one

A B C D 1. Hanging and mending gill nets

A B C D 2. Repairing trawl nets and seines

A B C D 3. Rigging crab pots

A B C D 4. Gill net fishing techniques

A B C D 5. Salmon trolling techniques

A B C D 6. Otter trawl techniques

A B C D 7. Crab fishing techniques

A B C D 8. Whaling techniques

A B C D 9. Icing and refrigeration

A B C D 10. History of fishing industry- foreign and domestic

A B C D 11. Preservation of the catch aboard

A B C D 12. Preservation of the catch - canning, freezing, smoking, etc.

A B C D 13. Purchasing fishing gear

A B C D 14. Recognition of species

A B C D 15. Fish propogation in hatcheries and ponds

Additions and comments:____

____

Key: A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

Navigation

Circle one

A B C D 1. Celestial navigation
A B C D 2. Coastal navigation
A B C D 3. Rules of the Road
A B C D 4. Aids to navigation, ie buoys
A B C D 5. Motor boat laws
A B C D 6. Mariner's compass as used in navigation
A B C D 7. Nautical charts - laying courses
A B C D 8. Dead reckoning
A B C D 9. Basic navigational aspects of tides and winds
A B C D 10. Methods of signalling - Morse code, semaphore, etc.

Additions and comments:

Mechanical, Hydraulic and Pneumatic Practices

Circle one

A B C D 1. Internal combustion engines (gas) - tuning up
A B C D 2. Internal combustion engines (gas) - maintenance
A B C D 3. Internal combustion engines (gas) - complete overhauling
A B C D 4. Internal combustion engines (diesel) - operation and maintenance
A B C D 5. Internal combustion engines (diesel) - complete overhauling
A B C D 6. Steam engines - care and operation
A B C D 7. Lining up engines to shaft couplings
A B C D 8. Engine room piping and plumbing

KEY: A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

Mechanical, Hydraulic and Pneumatic Practices (Continued)

Circle one

A B C D 9. Deck winches - operation

A B C D 10. Welding, oxyacetylene

A B C D 11. Welding, heliarc

A B C D 12. Operation of metal-turning lathe

A B C D 13. Operation of all basic machine shop equipment

A B C D 14. Principles of hydraulic equipment (operation and installation)

A B C D 15. Principles of pneumatic devices (operation and installation)

A B C D 16. Winches and gurdies - installation and operation

A B C D 17. Repair of outboard motors

A B C D 18. Compressors and pumps

A B C D 19. Installation, maintenance and use of refrigeration equipment.

A B C D 20. Installation and use of heat exchangers

A B C D 21. Desalting equipment

A B C D 22. Problems in use of propellors and shafting

A B C D 23. Turbines - operation and maintenance

Additions and comments:____

____

Electricity and Electronics

Circle one

A B C D 1. Electronics - operation of marine electronics equipment

A B C D 2. Electronics - maintenance and repair of marine electronics equipment

- -

Key: A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

Electricity and Electronics (Continued)

Circle one

A B C D 3. Basic electricity (not electronic) - direct and alternating current theory

A B C D 4. Electric motors - maintenance and light repairs

A B C D 5. Batteries - testing and maintaining

A B C D 6. Wiring-up engines - marine

A B C D 7. Installation of marine light wiring circuits

A B C D 8. Maintenance of marine light wiring circuits

Additions and comments: ____

____

Related Training

Circle one

A B C D 1. Drafting

A B C D 2. Map making

A B C D 3. Interpretation of drawings and maps

A B C D 4. Preparation of written technical reports

A B C D 5. Making of oral reports and short speeches of a technical nature

A B C D 6. Use of slide rule

A B C D 7. Galley cooking

A B C D 8. Scuba diving

A B C D 9. Typing

A B C D 10. Bookkeeping

A B C D 11. Selling and marketing

A B C D 12. Appraisal of boats and marine equipment

KEY: A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

Related Training (Continued)

Circle one

A B C D 13. Marine insurance - types of policies

A B C D 14. Meteorology

A B C D 15. Report writing

A B C D 16. Fundamentals of marine carpentry

Additions and comments:

General Education

Circle one

A B C D 1. Labor laws, unions and labor legislation

A B C D 2. Speed reading

A B C D 3. Employer-employee relations

A B C D 4. Applied economics

A B C D 5. Introduction to psychology

A B C D 6. Psychology of human relations

A B C D 7. Public speaking

A B C D 8. Job-seeking techniques

A B C D 9. American institutions

A B C D 10. English fundamentals

A B C D 11. Fundamentals of physics

A B C D 12. Fundamentals of chemistry

A B C D 13. Geography

A B C D 14. Taxation

A B C D 15. First aid

KEY: A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

General Education (Continued)

Circle one

A B C D 16. Mathematics - up to and including algebra and trigonomentry

A B C D 17. Mathematics, including calculus .

Additions and comments____

____

Key: A - Absolutely should be taught.
B - Important, but could be omitted.
C - Helpful. Merits only a low priority in selection of subject content offered.
D - Not needed at all by persons training for this kind of work.

POTENTIAL STUDENTS

The largest source of first-year students in most post-high school vocational-technical programs is the output of high school graduates from the preceding school year. However, increasing numbers of people who have left high school before graduating and of people who are or have been currently employed, seek to elevate their effectiveness and employability through education. An effort to guage this source of potential students is herewith presented:

1. How many persons (not high-school students) come to you or your organization annually seeking employment who would not be particularly useful with their present abilities but who would be employable after successful completion of two years of training in marine technology?____________________ (Approximately)
2. How many persons working with you or your organization part-time would become employable more months of the year with this training?____________________________ (Approximately)
3. In your acquaintanceship, how many persons actually working now do you estimate may be interested in leaving work to take this kind of training if it is offered?__________(Approximately)

JOB OPPORTUNITY

This section is crucial in translating the outcome of the survey into terms of really proceeding towards making a marine technology curriculum a catalog offering. Should early returns be encouraging in this respect, work towards completion of objectives in Part Two of the proposal will be intensified so that basic groundwork for a program will be completed at the end of the present academic school year. Creation of continuing number of new jobs is not necessary for a given number of hirings to be listed. Normal turnover in the same job will influence the number of job opportunities reported.

1. Where do you currently get the new people you hire in the kinds of positions which are the object of this survey?

____

2. To what entry opportunities with your firm or agency would you give preferential selection to persons with the education and training indicated in the tentative curriculum?

ENTRY JOB TITLE OR DEPARTMENT	ANTICIPATED NEEDS (Number) In 2 years	In 5 years

3. To what more advanced job positions could the above entry job lead?

JOB TITLE OR DEPARTMENT	ANTICIPATED NEEDS (number) In 2 years	In 5 years

4. Nature of business, industry or governmental agency:

____

____

5. Does your firm have any current job vacancies? ________________

If yes, in what job area? Please specify: ________________

____

____

____

WOULD YOU LIKE A COPY OF THE SURVEY REPORT? YES ☐ NO ☐

SECTION FOUR

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